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PRODUCING REFINING PIPELINE ENGINEERING MARKETING

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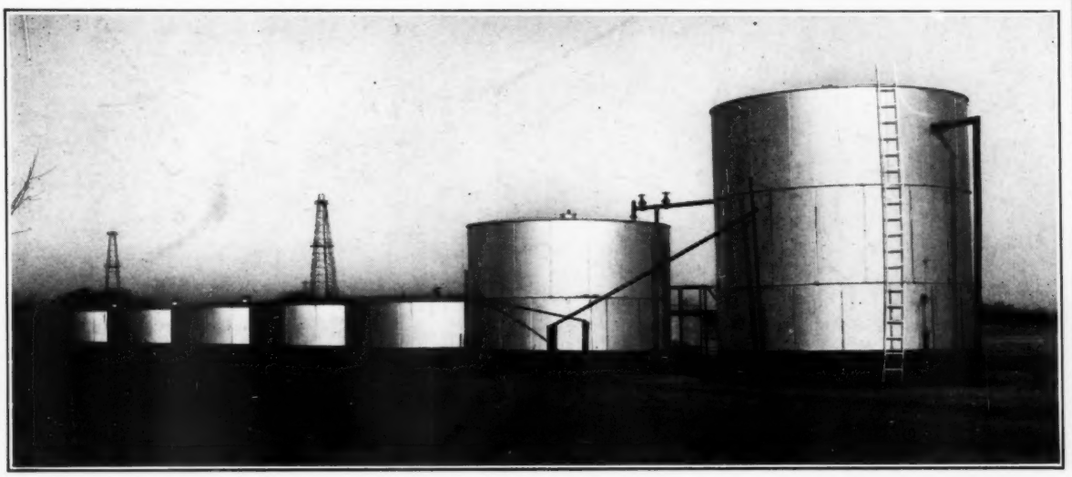

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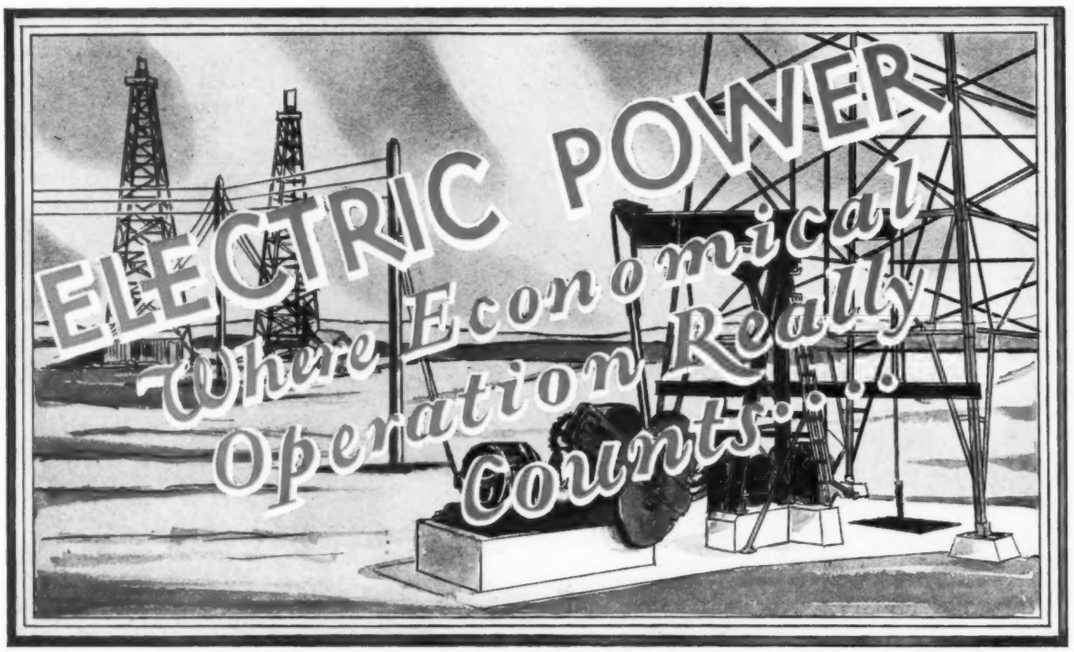
Advertisers' Index on Page 17 | Table of Contents on Page 18



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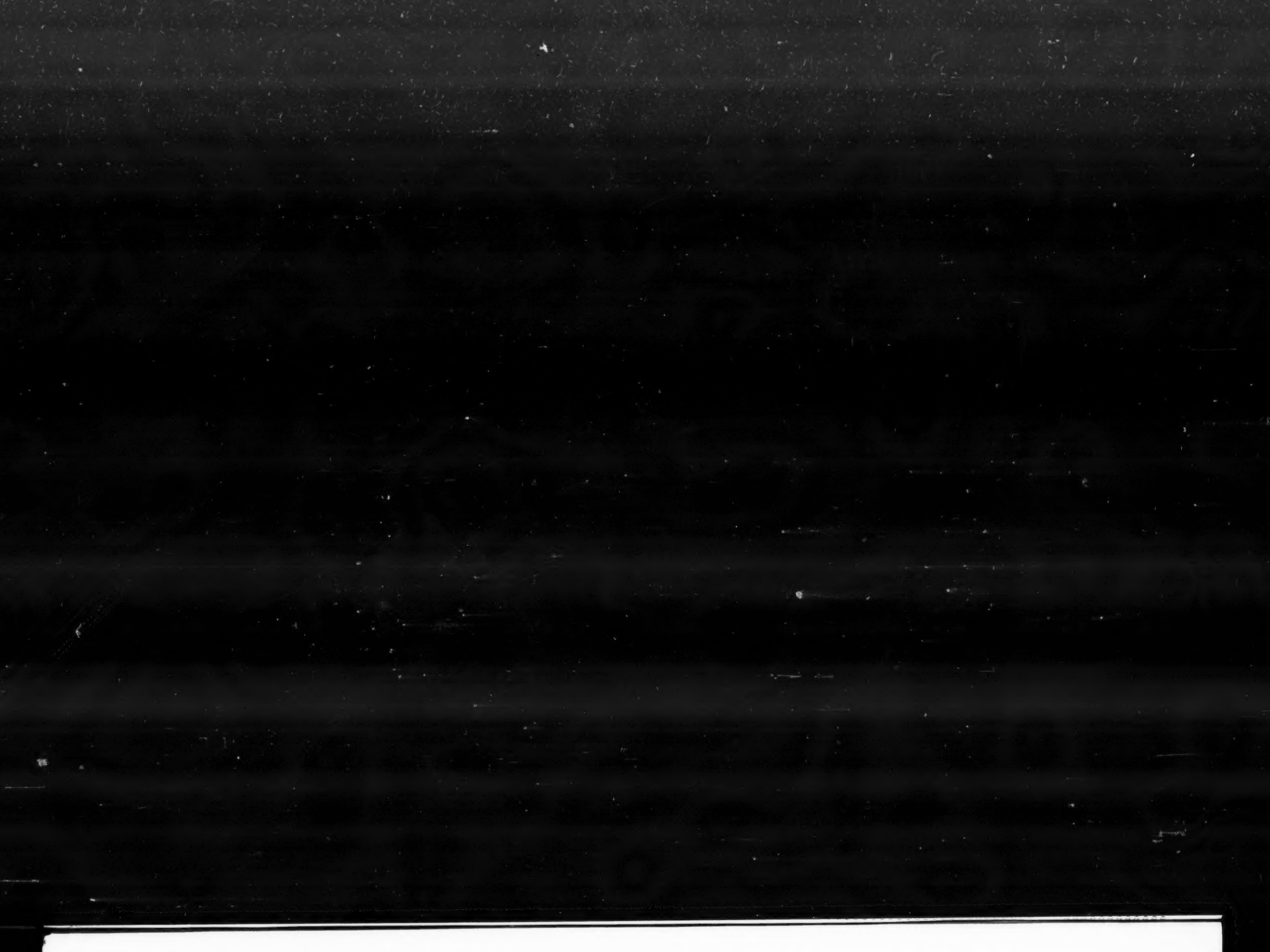

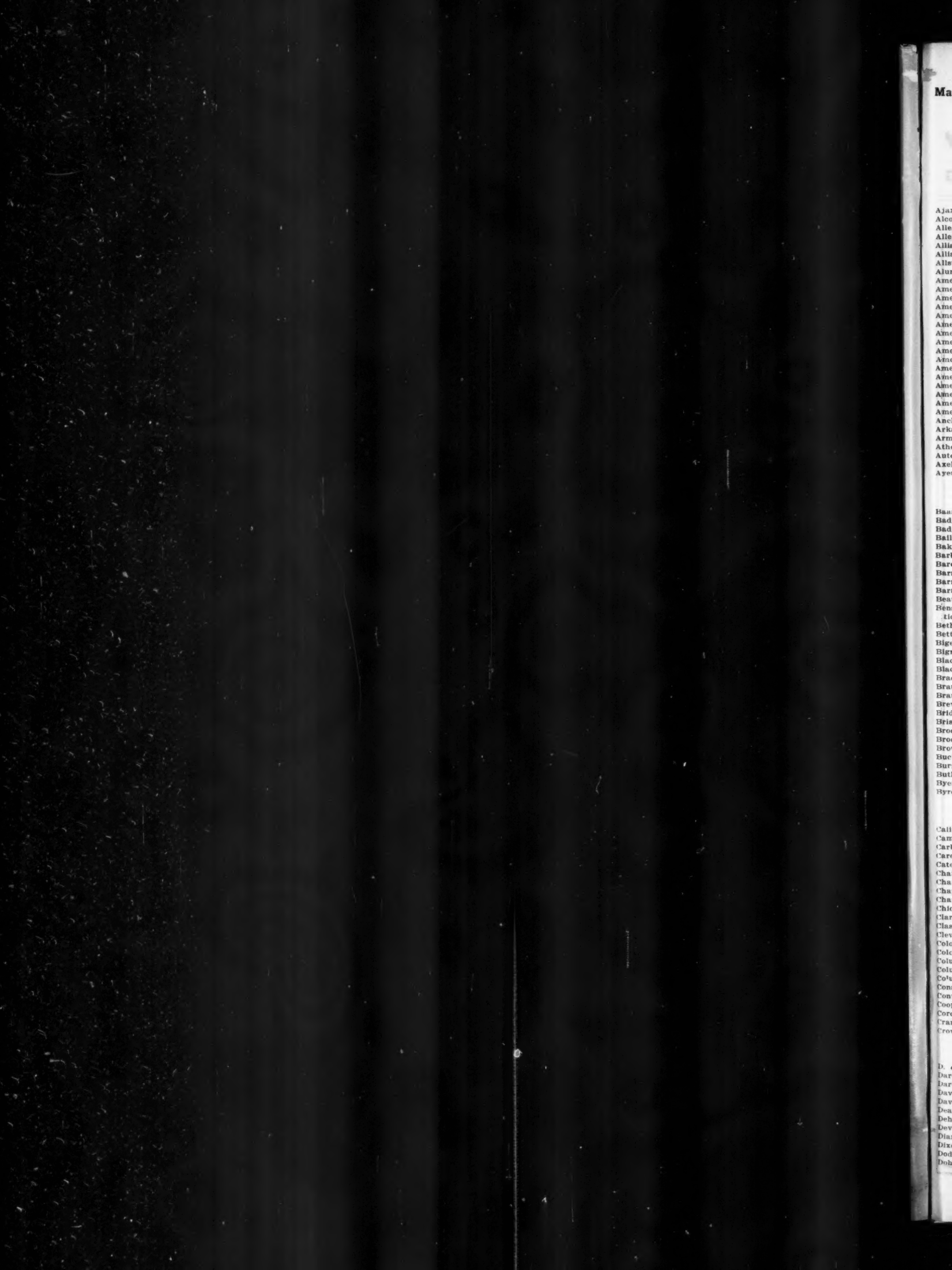

The ADVERTISERS' INDEX

A

Ajax Iron Works
Alco Products, Inc.
Allegheny Steel Co.
Allen Corp., The
Allis-Chalmers Mfg. Co.
Allis, Louis, Co., The
Allsteel Products Mfg. Co., Inc., The
Aluminum Co. of America
American Assn. of Petroleum Geologists
American Cable Co., Inc.
American Cast Iron Pipe Co.
American Iron & Machine Works Co.
American La France & Foamite Corp.
American Meter Co. 75
American Radiator Co.
American Rolling Mill Co., The
American Schaeffer & Budenburg Corp.
American Sheet & Tin Plate Co.
American Stainless Steel Co. 146
American Steam Pump Co.
American Steel & Wire Co. 9
American Steel Works
American Tank & Equipment Corp.
American Well Works, The 158
Anchor Post Fence Co.
Arkansas Natural Gas Corp.
Armstrong Machine Works
Athey Truss Wheel Co.
Automotive Distillate Corp.
Axelson Mfg. Co., Ltd. 83
Ayer & Lord Tie Co.

B

Baash-Ross Tool Co.
Badger, E. B., & Sons Co.
Badgett Steam Lubricator Co.
Bailey-Becker Co.
Baker Oil Tools, Inc. 156
Barber-Greene Co. 12-13
Baroid Sales Co.
Barnickel, Wm. S., & Co.
Barnsdall Refineries, Inc.
Barrett Co., The 78
Beaumont Iron Works Co., The
Benson & Henderson Pipe Line Construction Co.
Bethlehem Steel Co. 4
Bettis Sales Co.
Bigelow-Liptak Corp.
Bignall & Keeler Machine Works
Blackor Co. 84
Black, Sivalls & Bryson, Inc.
Bradford Motor Works, Inc.
Brauer Machine & Supply Co. 37
Braun, C. F., & Co.
Brewster Co., Inc., The 107
Bridgeport Machine Co.
Bristol Co., The
Broderick & Bascom Rope Co.
Broderick Co., The
Brown Instrument Co.
Buckeye Traction Ditcher Co.
Burford Oil Co.
Butler Mfg. Co.
Byers, A. M., Co.
Byron Jackson Co.

C

California Talc Co.
Campbell Co., J. A.
Carbondale Machine Co.
Carey, Philip Co., The
Caterpillar Tractor Co. 5
Chain Belt Co.
Champion & Barber, Inc.
Chaplin-Fulton Mfg. Co., The 156
Chapman Valve Mfg. Co., The
Chicago Bridge & Iron Works 43
Clark Brothers Co.
Classified Wants 124-125-126
Cleveland Trencher Co., The
Colona Mfg. Co.
Colorado School of Mines 157
Columbian Rope Co.
Columbian Steel Tank
Columbus Forge & Iron Co., The
Consolidated Ashcroft Hancock Co., Inc.
Continental Supply Co., The
Cooper-Bessemer Corp., The 76-77
Corona Products, Inc.
Crane Co.
Crowe Laboratory Appliances

D

D. & B. Pump & Supply Co.
Darling Valve & Supply Co.
Dart, E. M., Mfg. Co.
Davey Compressor Co.
Davis Regulator Co. 148
Dearborn Chemical Co.
Dehydro, Inc.
Devine Mfg. Co., Inc., J. P.
Diamond Rubber Co. 111
Dixon Crucible Co., Joseph
Dodge Brothers Corp. 11
Doheny Stone Drill Co.

D

Donovan Boiler Works, Inc.
Dresser, S. R., Mfg. Co. 29
Driftmeter, Inc.
Dunn Brothers
Du Pont de Nemours & Co., Inc., E. I.
Duriron Co., Inc., The

E

Eagle-Picher Lead Co. 147
East Texas Refining Co.
Economy Pump & Oil Tool Co., The
Edward Valve & Mfg. Co., Inc.
Elliott Mfg. Co.
Empire Oil & Refining Co.
Ethyl Gasoline Corp.
Exchange Banks of Tulsa

F

Falk Corp., The
Fenwick-Reddaway Mfg. Co.
Fisher Governor Co.
Foote Bros. Gear & Machine Co.
Fort Worth Chamber of Commerce
Foster Wheeler Corp. 128
Foxboro Co., Inc., The
Franklin Valveless Engine Co.
Frick-Reid Supply Corp.

G

Gardner-Denver Co. 6
Garlock Packing Co., The 102
Gaso Pump & Burner Mfg. Co. Inside Back Cover
Gates Rubber Co.
General American Tank Car Corp.
General Electric Co.
Globe Oil Tools Co.
Goodrich, B. F., Rubber Co., The
Goodyear Tire & Rubber Co.
Goslin-Birmingham Mfg. Co.
Gott, H. P., Mfg. Co., Inc. 158
Goulds Pumps, Inc.
Granger Indicator Co. 90-91
Granite City Steel Co.
Grant Oil Tool Co.
Gray Processes Corp., The
Grinnell Co., Inc. 40-41
Griscom-Russell Co., The
Guiberson Corp., The
Gulf Refining Co. 155

H

Halliburton Oil Well Cementing Co. 59
Hamer Oil Tool Co., Ltd.
Hanlon-Waters, Inc.
Harrisburg Pipe & Pipe Bending Co. 10
Hazard Wire Rope Co.
Headley Emulsified Product Co.
Heeter, Sons & Co., Inc., C. M.
Hercules Motors Corp. 7
Hercules Supply Co.
Hercules Tool Co.
Hewitt-Gutta Percha Co.
Heydrick Mapping Co. 157
Highland Iron & Steel Co., The
Hill, Hubbell & Co.
Hope Engineering Co.
Hopper Machine Works, Inc.
Hough, Charles N., Mfg. Co., The
Hughes Tool Co. Back Cover
Humble Oil & Refining Co.

I

Improved Steel Gas Engine Head Co.
Industrial Brownhoist Corp.
Industrial Dallas, Inc. 48
International Derrick & Equipment Co., The
International Harvester Co. of America
International Nickel Co., Inc., The 151
International-Stacey Corp. 144
International Supply Co.

J

Jackson Co., Byron
Jackson Engineering Corp.
Jarecki Mfg. Co. 53
Jenkins Engineering Co.
Jenkins Bros.
Jerguson Gage & Valve Co.
Johns-Manville 46
Jones & Laughlin Steel Corp. 86-87

K

Kellogg, M. W., Co., The 14
Kelly, John Eoghan
Kennedy Valve Co., The 159
Kerotest Mfg. Co.

K

Key Boiler Equipment Co.
Kirk-Morrow Iron Works, Inc.
Kohler Co.
Koppers Co., The

L

Landis Machine Co., Inc.
Larkin Packer Co.
Layne & Bowler Co.
Leader Iron Works, Inc.
Lemons, Inc., Henry L.
Leonard Construction Co.
Limbert & Co., George B. 157
Lincoln Electric Co.
Linde Air Products Co.
Littleford Bros. Co.
Longyear, E. J., Co. 149
Lucey Products Corp.
Ludlow Valve Mfg. Co.
Lufkin Foundry & Machine Co., The
Lummus Co., The
Lunkenheimer Co., The 99

Mc

McAlear Mfg. Co., The
McCord Radiator & Mfg. Co.
McEverlast, Inc.
McEvoy, J. H., & Co.
McIntosh & Seymour Corp.
McKee, Arthur G., & Co.

M

MacClatchie Mfg. Co.
Magnolia Petroleum Co.
Mair, D. S., Machinery Corp. 158
Maloney Tank Mfg. Co. Front Cover
Marsh Gauge Pole Co. 158
Martin-Decker Corp.
Merco Nordstrom Valve Co.
Metric Metal Works 75
Michigan Valve & Foundry Co.
Mid-Continent Map Co.
Midwest Piping & Supply Co., Inc.
Mine Safety Appliance Co.
Moon Mfg. Co., The
Moore, Lee C., & Co., Inc. 66-67
Mooriane Co., Inc.
Morris, I. P., & De La Vergne, Inc.
Moser Manufacturing Co.
Multiplex Display Fixture Co.
Munn & Co. 157
Murray Tool & Supply Co.

N

National Airoil Burner Co. 157
National Equipment Corp. 15
National Lead Co.
National Supply Co. 80-81
National Tank Co.
National Tank Seal Co.
National Transit Pump & Machine Co. 27
National Tube Co.
Naylor Pipe Co.
Neilan Co., Ltd. 8
North American Car Corp.
Northwest Engineering Co.

O

Oakite Products, Inc.
O'Brien Steel Construction Co.
Ohio Injector Co., The
Oil Conservation Engineering Co., The
Oil and Gas Journal, The
Oil Well Supply Co. 16-55
Oklahoma Gas & Electric Co.
Ottumwa Iron Works
Oxweld Acetylene Co.

P

Page Fence Assn.
Page Steel & Wire Co.
Parkersburg Machine Co.
Parkersburg Rig & Reel Co., The
Patch, W. N.
Patterson-Ballagh Corp.
Perberthy Injector Co. 31
Petroleum Engineering, Inc.
Petroleum Equipment Co.
Petroleum Iron Works Co. 94
Pickering Governor Co., The 152
Pittsburgh-Des Moines Steel Co. 159
Pittsburgh Equitable Meter Co. 73
Pittsburgh Screw & Bolt Corp.
Pittsburgh Steel Products Co.
Plymouth Cordage Co. 153
Pomona Pump Co.
Powell, William, Co.
Power Piping Co.
Prescott Co., The
Prest-O-Lite Co., Inc., The
Public Service Co.
Pure Oil Co., The
Pyle-National Co., The

R

Reading Iron Co.
Reading Steel Casting Co., Inc. 93
R. F. Electrical Manufacturing Co.
Regan Forge & Engineering Co.
Reid, Joseph, Gas Engine Co. 68
Reo Motor Car Co.
Republic Steel Corp. 64
Republic Supply Co.
Robinson Orifice Fittings Co.
Ross-Meehan Foundries Co.

S

St. Louis Cordage Mills
Shaffer Tool Works
Sheldon Machinery Corp.
Sherwin-Williams Co.
Sinclair Refining Co.
Skelly Oil Co.
Smith, A. O., Corp. 2-3
Smith Separator Co.
Smooth-On Mfg. Co.
South Chester Tube Co.
Southern Cornice Works
Southern States Co.
Southwestern Construction Corp.
Southwestern Engineering Corp.
Spang & Co.
Spang, Chalfant & Co., Inc.
Sperry-Sun Well Surveying Co. 154
Standard Steel Works
Star Drilling Machine Co.
Steiner, George
Sterling Steel Casting Co.
Stockham Pipe & Fittings Co.
Stoody Co.
Strong Oil Tool Co.
Sullivan Machinery Co.
Sun Shipbuilding & Drydock Co.
Superheater Co., The
Sureshot Torpedo Co.

T

Tagliabue, C. J., Mfg. Co.
Taubman Supply Corp.
Taylor Forge & Pipe Works
Technical Products, Inc. 157
Texas Electric Service Inside Front Cover
Texas Pacific Coal & Oil Co. 98
Texas Steel Co.
Thompson, J. D., Jr. 157
Timken Roller Bearing Co., The 89
Titusville Iron Works Co.
Toledo Pipe Threading Machine Co., The 157
Trackson Co.
Tractor Truck Equipment Co.
Tretolite Co.
Trimont Mfg. Co.
Truscon Steel Co.
Tube Turns, Inc.
Tulsa Boiler & Machinery Co.

U

Union Carbide & Carbon Corp.
Union Wire Rope Co. 71
United Engineers & Constructors
United Gas System
United States Shipping Board Merchant Fleet Corp.
Universal Oil Products Co. 33

V

Vacuum Oil Co.
Vellumoid Co., The
Vez Co., The
Vickers Machine Co.
Victaulic Co. of America
Victor Balata & Textile Belting Co.
Vogel, Felix A. 157
Vogt, Henry, Machine Co. 113

W

Wagner Electric Corp. 145
Wailes, Dove-Hermiston Corp.
Wall Rope Works, Inc.
Walworth Co. 1
Warren Petroleum Co.
Waukesha Motor Co.
Westco Pump Corp.
Westcott Valve Co.
Western Gas Construction Co., The
Westinghouse Electric & Mfg. Co., The
White Co., The
Wickwire Spencer Steel Co.
Wico Electric Co.
Williamsport Wire Rope Co.
Wilson-Snyder Mfg. Corp.
Winkler-Koch Engineering Co., The
W. K. M. Co., Inc.
Worthington Pump & Machy. Corp.
Wright Manufacturing Co.
Wyatt Metal & Boiler Works

Y

Young Engine Corp.
Youngstown Sheet & Tube Co., The

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Table of Contents

SPECIAL ARTICLES

Big Decline in East Texas Production 19
By James McIntyre
Large temporary increase in Oklahoma City's output partly offset results of proration in new field.

Nation-Wide Network of Gas Pipe Lines 21
By Thomas F. Smiley
Natural gas convention anticipates greater expansion in next decade.

Upshur Latest East Texas Oil County 21

Cracking Gases on Commercial Scale 22-23
By Walter J. Podbielniak
Production of aromatics and olefins by thermal decomposition.

Comprehensive View of Oklahoma City Field 24
By W. A. Spinney
Area reviewed as to status, potential and ultimate output.

Rumania to Build Gasoline Line 24

Compressic and Transmission of Gas 25
By P. McDonald Biddison
Line diameter and compressor spacing to obtain required capacity.

Big Record in Pipe Line Construction 26
By A. E. Mockler
Remarkable achievements of engineering firm.

Built Upon Sand (Editorial) 28

Operate With Low Steam Consumption 30
By A. P. Frame
New gasoline recovery system at Petty's Island.

Texans Feature Dallas A.P.I. Production Program 35

Fire Is Out But East Texas Well Flows Wild 51

Pipe Line Construction News 52

How Natural Gas Gets to Your Home 54
By L. G. E. Bignell
Laying out of city and village distributing systems.

Drilling Practices in Mid-Continent 57
By B. M. Nowery
Surface conditions range from marsh to mountains.

Multiplicity of Sands in Saxet Field 57
By B. D. Stevenson

East Uses Unique Production Methods 58
By Samuel W. Meals
Various methods of recovering natural gas originated there.

Testing Large Positive Meters in Field 60
By John C. Diehl
Three methods offered, all accurate if properly used.

Subsurface Conditions Important in Selecting Site 60
By J. French Robinson

Gas Production in Mid-Continent Area 61
By Ross M. Stuntz
Usually better to exhaust each sand in turn.

Sales Energy Needed in Gas Business 62
By B. H. Gardner
Outlook never bright but industry must be alive.

Origin and Removal of Pipe Line Dust 63
By D. A. Sillers
May come from great variety of sources.

Pennsylvania Geologists Report on Tioga County 65

Scouting With the Journal's Cameras 74

Field Problems and Their Solution 82

Solubility of Natural Gas in Crude Oil 92
By Ben E. Lindsly
Preliminary report of investigation by Bureau of Mines.

Bottom Hole Pressures in Oil Wells 95
By C. V. Millikan and Carroll V. Sidwell
Data now recognized as fundamental in recovering oil.

Text of New Texas Conservation Law 106

Natural Gasoline Association Program 130

National Scouts Association Meeting 131

W. R. Boyd Shows Borah in Error 139

FIELD OPERATIONS

Late Fields 32

Oklahoma 34
By W. A. Spinney

Kansas 36
By W. A. Spinney

North Louisiana-Arkansas 38
By J. R. Crumpton

Gulf Coast 39
By Neil Williams

Southwest Texas 42
By B. D. Stevenson

California 44
By L. P. Stockman

Michigan 45
By Paul A. Elliott

Rocky Mountain Area 47
By Tolbert R. Ingram

Corning Gas Field 47

East Texas 49
By L. E. Bredberg

West and North Texas and Panhandle 51
By L. E. Bredberg

Central West and Kentucky 65
By George A. Whitney

Eastern Fields 69
By Staff Correspondent

Canada 69
By Victor Lauriston

REFINING AND MARKETING

Refinery Gasoline Movement Increases 20
By C. O. Willson
Lower prices stimulating demand from Oklahoma plants.

Technical Questions Answered 85
By C. K. Francis, Ph.D.

Chicago Price Trend Still Downward 122
By Robert C. Conine

Eastern Market in Unsettled Condition 123
By A. E. Mockler

Brief Items for Petroleum Refiners 129

Natural Gasoline Manufacture 130

Refinery and Crude Prices 132-133

Tank Wagon Quotations 134

Of Interest to Sales Departments 135

DEPARTMENTS OF GENERAL INTEREST

The Advertisers' Index 17

Personal Paragraphs About Oil Men 70

Natural Gas Developments 72

Oil Industry Equipment and Supplies 79-88

Classified Want Advertisements 124-125-126

Oil Securities Market 136-137

Crude Petroleum Statistics 160

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Refinery Section Starts on Page 122

Big Decline in East Texas Production

Highest production in 1930, week ending Feb. 22, average daily output 2,699,096 bbls. Peak of U. S. production, week ending Aug. 24, 1929, average 2,975,435 bbls.

Large Temporary Increase in Oklahoma City's Output Partly Offset Results of Proration in New Field

By James McIntyre

Lowest daily average crude oil production in the United States during 1930 was for week ending Dec. 27 with average output of 2,144,074 bbls.

While crude oil production in the United States last week declined 19,692 bbls., the crude oil output in the East Texas Field fell off 86,595 bbls. in the first week of proration. An appreciable decline in production was prevented by the action of Oklahoma City producers in taking advantage of the privilege of combining their semimonthly production tests into one, thereby temporarily increasing production in that field 62,610 bbls. per day. California also increased its production. The work of bringing East Texas down to 160,000 bbls. a day may take some time as the machinery of proration is necessarily slow in its early stages. It is expected that by the end of the month there will be a great improvement.

The production of the United States is still 262,000 bbls. in excess of estimated refinery requirements.

The East Texas production situation is much improved. The Sinclair Refining Co. entered the field as a buyer this week, posting the regular Oklahoma-Kansas price scale following the lead of the Magnolia, Humble and Gulf companies. The area now has three distinct posted prices, with the large companies paying the highest prices, an average of 65 cents per barrel, while smaller buyers are posting 40 cents and 25 cents flat for oil in that area and others have been buying at less than 20 cents. Cutting crude output 28 per cent last week tightens the market and should strengthen the price situation there as well as preserving unnecessary crude in the ground.

It may take some time for the improved crude oil situation to affect the terribly demoralized refined market, which is worse at this time than it has been in years. Reducing the production of East Texas to actual crude requirements should do away with the sacrificing of oil at 15 and 20 cents per barrel, and create a demand for the product in line with its worth as a refinable crude and at prices that will eventually bring a good profit to the producer.

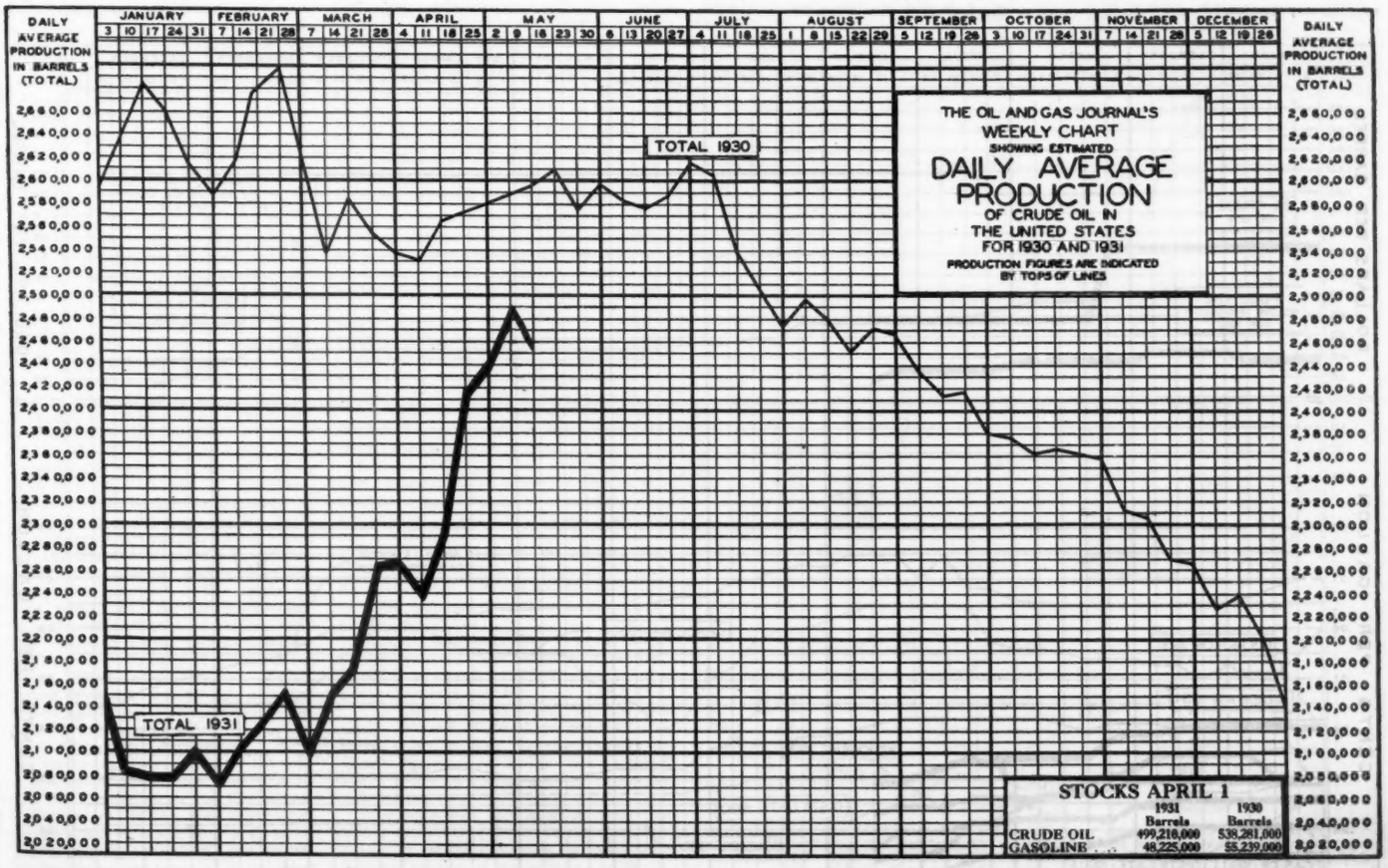
With no opportunity for a few refiners to buy oil at senselessly low prices the refined market must readjust itself, and get back on a profit-making basis.

PRODUCTION IN THE UNITED STATES

Estimated daily average production of crude oil in the United States for week ended May 9 and a comparison with the previous week follows:

	May 9	May 2
Oklahoma—		
Oklahoma City	222,145	159,535
Seminole-St. Louis	147,660	153,445
Remainder of State	237,396	237,435
Total Oklahoma	607,201	550,415
West Texas—		
Hendricks	44,330	44,943
Yates	74,812	71,858
Remainder	92,812	93,703
Total West Texas	211,954	210,504
North Louisiana	39,825	39,045
Arkansas	46,955	46,860
North Central Texas	80,049	81,918
Texas Panhandle	55,673	56 611
East Central Texas	322,771	396,705
Kansas	108,305	107,325
Total Mid-Continent area	1,472,733	1,489,383
Gulf Coast	181,871	181,293
Southwest Texas	67,636	70,808
Eastern	111,500	110,000
Rocky Mountain area	92,299	97,997
California—		
Santa Fe Springs	73,500	74,000
Long Beach	88,000	87,500
Playa Del Rey	29,500	28,750
Elwood	35,500	35,500
Ventura Avenue	46,000	48,500
Kettleman Hills	31,500	28,000
Remainder of State	231,000	229,000
Total California	535,000	531,250
Total United States	2,461,039	2,480,731

→ Decrease 19,692 Bbls. Daily ←



Refinery Gasoline Movement Increases

Lower Prices Stimulating Demand From Oklahoma Plants. Fuels, Kerosene, Bright Stocks and Neutral Oils Generally Reduced

By C. O. Willson

The gasoline movement from Oklahoma refineries and those located in adjoining states showed a decided improvement the past week. Prices continued to sag the latter part of last week, but the lower quotations proved attractive to many buyers in the middle western states and the spot demand increased.

In Oklahoma, the spot price for specification U. S. Motor gasoline dropped to a low of 2¾ cents. At this price, orders began to increase and at least two refiners who sold at this level advanced their price to 3 cents the first of this week. Sales on contracts also improved so that one refiner whose gallonage has been aided with a third grade through his own stations reported a regular "summer business."

Refinery gasoline apparently was the only product to experience an increase in consumption although some natural gasoline manufacturers found outlets for their products more readily. All grades of fuels, gas oils and distillates are available at lower prices and price concessions are being made in the sale of kerosene, lubricants and wax. Gas oil has slumped to the point where it is being quoted on a barrel instead of a gallon basis by some sellers, a low of 40 cents being asked for industrial and U.G.I. grades. Trading in these products is slow regardless of price.

Bright stocks, steam refined cylinder stocks and neutral oils moved to lower levels the past week when several of the largest manufacturers in Oklahoma announced lower quotations to meet competitive conditions. The reductions in bright stocks averaged about 1 cent a gallon with one-half to 2 cents per gallon in several grades of viscous neutral oils. The greatest reductions were in the higher viscosity grades.

REFINED MARKET BAROMETER

The past week in refined markets was featured with price reductions in all the principal products at one or more refining centers. The fact that gasoline consumption is showing a seasonal increase has not prevented lower prices from becoming effective at a number of refineries reflecting price war conditions in the retail end. Export prices have also been reduced. Kerosene continues weak with scattered price reductions at refineries. The demand for fuel oils at both coastal and interior points was not sufficient to change a weak situation in that product. A similar situation obtains in gas oils and furnace oil distillates. Natural gasolines continue to sell at the lowest levels in years. In the lubricating list, general reductions became effective in bright stocks, steam refined stocks and neutral oils. The wax market is not active with no important changes in prices.

Mid-Continent—Prices on gasoline lower although demand more active. Kerosene prices reflect slow demand. Fuel oils, distillates and gas oils weak. Natural gasoline prices reduced. General reduction in viscous neutral oils with greatest reductions in higher viscosities. Steam refined stock and bright stocks lower. Wax slow.

East Coast—Sweeping price reductions in principal products including gasoline, kerosene, Diesel oil, gas oil and lubricating oils. Tank car market generally unsettled.

Chicago—Refinery and natural gasoline prices lower. Downward revision in fuel oil and gas oil prices. Kerosene steady.

Pennsylvania—Gasoline fairly firm. Kerosene and fuel oil prices reduced with scattered reductions in neutral oil and bright stock lists.

Gulf Coast—All grades of pale and red neutral oils reduced one-half cent. Fuel oil and gasoline prices lower.

California—Gasoline market weak due to competition in station operations where prices are at the lowest levels in several years.

Situation May Improve

The improved demand for gasoline, coupled with the proration of the East Texas fields, has brought a better feeling among some of the refining fraternity. However, the fact that one buyer has posted lower prices for crude oil in that area and also in North Texas fields is interpreted adversely by others and opinions are divided as to whether the market is scheduled for a gradual recovery or a continued decline. The pessimistic fear that the lower prices will be met by other buyers and then will spread to adjoining Mid-Continent areas.

It is conceded that a majority of refiners who are paying posted prices for their crude oil supplies and selling at open market prices cannot break even in their operations. From these operators there is considerable agitation for lower schedules until such time as the refinery market shows improvement. Much will depend on what develops over the next week or ten days in the East Texas proration. It is contended by those opposed to additional crude cuts that outlets for all the available crude oil will be found at the prices posted by the major companies. If this develops it will remove the market threat of distress crude oil supplies which unquestionably have been an important factor in the recent price declines of the Mid-Continent market.

Reasons for Increase

The gain in gasoline demand is explained as largely seasonal. Gasoline consumption gains rapidly the last half of May under normal conditions culminating in Decoration Day the first holiday period of the main gasoline consuming season. Some of the gasoline buying has been in preparation for this demand.

Apparently satisfied that prices will not go lower, many jobbers are no longer pursuing a "hand-to-mouth" policy in their purchases, but are filling their storage for the summer demand. The storage facilities of most of the jobbers is not large when compared with the refinery storage but in the aggregate is sufficient to be a market factor.

Although no accurate comparisons are available, representative opinion from those in close touch with the retail situation, is to the effect that the recent declines in prices are serving to stimulate consumption in the Middle West and Southwest. It is believed that many car owners have been attracted by the lower prices and are now using their cars more. Coming at the start of the gasoline consuming season this development may serve to offset a situation which many feared would result in decreased consumption over the next few months, when compared to last summer. Just how important this may be in some states is reflected in the March gasoline

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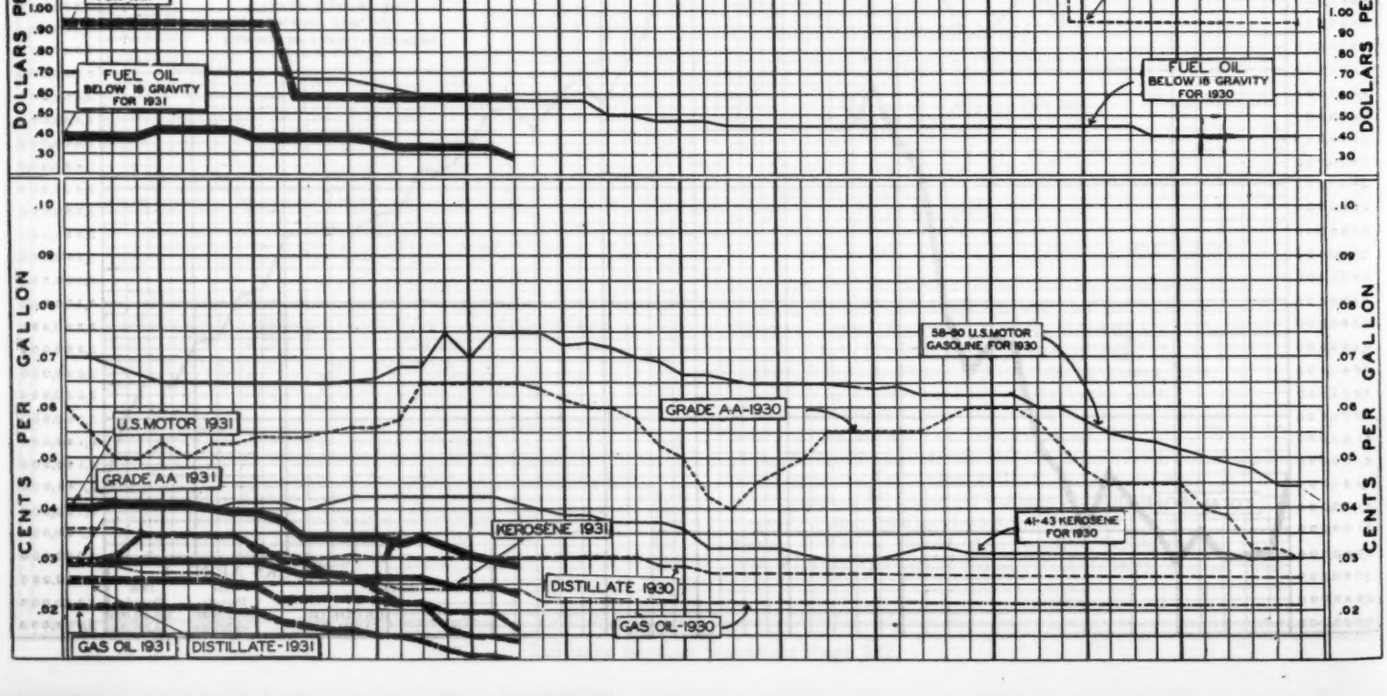

Nationwide Network of Gas Pipe Lines

Natural Gas Convention Anticipates Greater Expansion in Next Decade. Further Reduction in Waste Expected

By Thomas F. Smiley

MEMPHIS, Tenn., May 12.—Further reduction in the waste of natural gas may be expected as a result of steps taken by the committee on natural gas conservation and reported to the delegates attending the annual convention of the Natural Gas Department of the American Gas Association, which opened in the Hotel Peabody this morning and will continue till Thursday. The conservation committee reported that it had formed a committee on conservation data, with E. P. Hindes, chief geologist for Henry L. Doherty & Co., New York, as chairman, and a committee on distribution conservation, with T. H. Kerr, of the Ohio Fuel Gas Co., Columbus, Ohio, as chairman.

In the research so far made it has been developed that much natural gas is being lost, chiefly in the field, at the point of production. Furthermore, it was reported, the loss is largely in connection with oil wells and not gas wells. Notwithstanding what it regards as absence of material responsibility, the natural gas industry, acting through its organization affiliated with the American Gas Association, has taken definite action toward an extended and intensive research into improved methods of production and distribution, looking to the elimination of all avoidable losses. This study, it is hoped, will be of far-reaching value to the present and future generations through making natural gas available to more persons and for a longer period of time. L. B. Denning, of Dallas, Tex., is chairman of the committee on natural gas conservation. It was reported as likely that Canada would join with this country in conservation measures.

Double Disappointment

Although there is abundant evidence that the 1931 meeting of natural gas men will exceed its predecessors in point of attendance, interest and profitable discussion, there was one distinct disappointment. Neither John B. Corrin, vice president of the Peoples Natural Gas Co., nor Samuel W. Meals, president of the Carnegie Natural Gas Co., came. Nobody who has been attending these yearly meetings until it has got into his blood needs to be told that while absence of either of these Pittsburgh men is a clear cause for regret, the simultaneous failure of both to appear is calculated to inject huge chunks of gloom into an atmosphere otherwise bright and joyous.

Col. M. W. Walsh, of Louisville, Ky., was among the early arrivals and when he was told that neither of the Pittsburgh men would be here he withdrew to the recesses of a big chair in the hotel lobby and morosely gnawed at his cigar. Berny Oakland, of Monroe, La., emitted something like a growl and boarded the next upbound elevator. "We might as well go home," was the lugubrious comment of Frank L. Chase, of Dallas, Tex., but as incoming trains and automobiles brought fresh contingents of delegates the shadows lifted and Colonel Walsh, emerging from his melancholy, admitted it looked as though this convention was going to be a hummer.

Phenomenal Expansion

The phenomenal expansion of the natural gas industry in recent years is reflected in the character of the papers and discussions before the convention. Problems dealt with are largely those involved in producing natural gas in tremendous volume and carrying it the great distances that now lie between the points of supply and the points of consumption. The perplexing problems of economical distribution, demanding as they do a high order of engineering skill and executive ability, are receiving attention also.

Marvelous as the progress in the natural gas field has been in the last 10 years, the next decade will bring developments even more amazing, according to opinions expressed by leaders in the industry attending the convention. Among predictions made is that 1940 will see a nationwide interconnecting system of pipe lines for the transportation of this fuel to all cities. It is declared that the country is entering what may be termed a fuel era, with natural gas as the young giant to watch and guide with care.

Among interesting facts brought out in connection with the convention are these: Consumption of natural gas in the United States has registered an increase of more than 130 per cent in the last 10 years owing to the discovery of new reserves, together with marked advances in methods of pipe manufacture and pipe line construction. Natural gas now is distributed in 32 states and by the end of 1931 will be available in 37. More than 3,250,000 customers of public utility companies were owners of the stocks of these companies at the end of 1930, representing an increase of about 250,000 in the last three years.

California's Advance

The swift advance of California as an oil and gas producing state was brought out in a paper prepared by L. M. Spencer, geologist for the Southern California Gas Co., Los Angeles, on drilling methods in that State. There are 39 producing areas in the State classified as oil fields, said Mr. Spencer. Production from these fields for February, 1931, was at an average daily rate of 533,248 bbls. of oil and 1,180,000,000 feet of gas from 9,295 wells. Besides this, much production is shut in. Statistics indicate that during the past five years there has been an average of about 450 drilling wells in constant operation in wildcat and producing areas. In this time 10 new fields have been discovered and there has been rapid and intense development of the prolific deep zones of the Long Beach and Santa Fe Springs Fields. There are only three areas, however, which produce gas only. These are Buttonwillow, Goleta Point and Tulare Lake. It was pointed out that there are important gas sands above the oil zones at Buena Vista Hills, Elk Hills and Kettleman Hills.

Manufactured Gas Replacement

The delegates were told that manufac-

(Continued on Page 139)

Upshur Latest East Texas Oil County

Mudge Oil Co.'s No. 1 Richardson, Extension to Lathrop Pool, Climaxes Eight-Year Search for Production. What the Record Shows

By Special Correspondent

TYLER, Tex., May 9.—Upshur became the fourth of the producing counties of the East Texas prolific fields when the Mudge Oil Co. and others' No. 1 Richardson was brought into production on May 5. It made 274 bbls. in two hours through a forty-two-sixty-fourths-inch choke. Located on a 100-acre tract in the David Ferguson Survey, it extends the Lathrop Pool 2¼ miles northwest. Previously, the Sultan-Stucky was the farthest northwest producer in this pool. Already $2,500 has been raised by Gilmer business men toward a bonus to be divided among the drilling crew on the Mudge-Richardson well. The well will be permitted to produce, under present proration order, only 100 bbls. daily between now and July 1.

Present Development

Tests are now going down at widely scattered areas throughout the county, insuring for the area the strongest play in its history. The Woodbine sand, the objective in every case, has been definitely proven to underlie all of Upshur County. It has been found to occur with a thicker section in the western part of the county than that encountered in Lathrop Pool producers to the east.

All drilling operations are being conducted by independent operators and small producing companies.

Eight active operations are being carried on within the county's limits at the present time. One is a shutdown, two are drilling, three are rigs up, and two are locations.

Penn Oil Co. and D. W. Smith's No. 1 O. B. Gage, in the J. B. B. Davenport Survey, is shut down in Georgetown lime at 4,095 feet, the Woodbine having proven unproductive.

Brannon & Woods' No. 1 W. D. Robertson, in the C. Ira Stephenson Survey, is drilling ahead at 3,360 feet in the lower Taylor formation.

The other drilling operation for the county is the E. R. Perkins, McPhail and Smith's No. 1 Kay, in the Thomas J. Elliott Survey, which is now drilling ahead after cementing surface casing at 180 feet.

Rigs have been erected at Arcadia Refining Co.'s No. 1 P. S. Johnson, in the James H. Mallory Survey, in the northwestern portion of the county; at W. J. Green's No. 1 J. W. Woodin, in Isham Williams Survey, in the southwestern portion, and at F. F. Beeler and others' No. 1 R. H. McClelland in the M. P. Torres Survey in the southeastern part of the county between Gilmer and Glenwood.

Locations have been staked at C. L. Starkey's No. 1 C. A. Lee in the Wilson L. Farmer Survey in the central portion of the county; and at McCullough and others' No. 1 John Copeland, in the Marshall Mann Survey, northwest of the DeArman and Burke failure at the No. 1 Fluellan in the same survey.

Since 1923, 11 wells drilled throughout the county proved unproductive and were abandoned. The following is the analysis of these total depths:

From 0	to 1,000 feet	0 well
From 1,000	to 2,000 feet	1 well
From 2,000	to 3,000 feet	3 wells
From 3,000	to 4,000 feet	4 wells
From 4,000	to 5,000 feet	2 wells
From 5,000	to 6,000 feet	0 well
From 6,000	to 7,000 feet	1 well

Only six tests drilled in Upshur County have reached the Woodbine sand, five of which proved failures. They are: Utex

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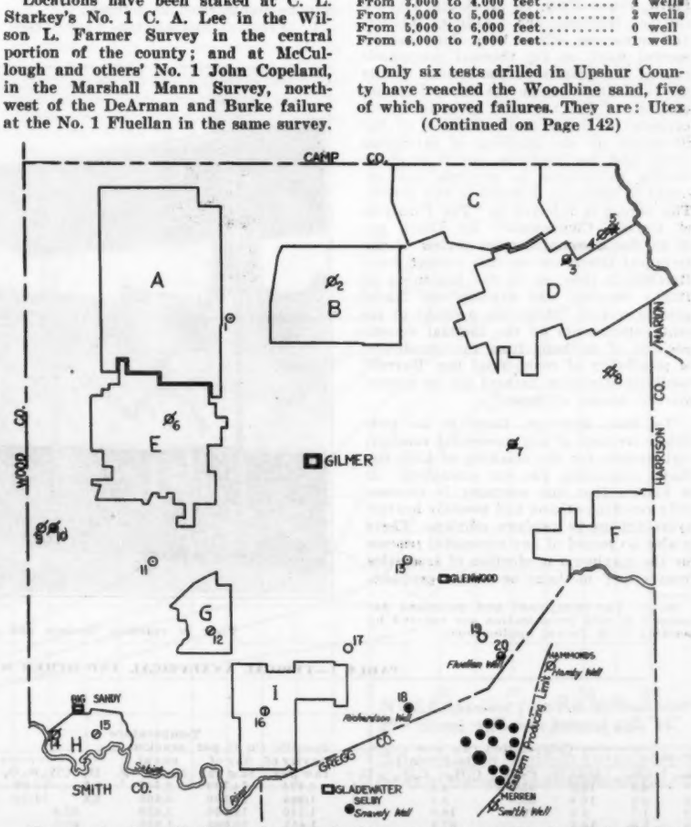


Map showing lease blocks in effect and development work, present and past, in Upshur County, East Texas. Oil was recently discovered in the southeastern portion, resulting in the strongest lease and drilling play the county has ever witnessed. In the accompanying article is given ownership in the blocks and record of each test.

Cracking of Gases on Commercial Scale

Production of Aromatics and Olefins by Thermal Decomposition of Lower Molecular Weight Hydrocarbons

By Walter J. Podbielniak
Research Chemical Engineer, Tulsa, Okla.

REPORT OF INVESTIGATION

In view of the present trend towards high antiknock motor fuels the possibility of production of aromatics from natural gas is of considerable interest to the natural gas and gasoline industry. Furthermore, it offers an outlet for waste gases such as excess natural gas, stabilizer vent gas, excess butanes in casinghead, and heavy refinery vapors.

Semi large scale experiments described in this article show yields of benzol and heavier aromatics as high as 2.7 gallons per 1,000 cubic feet of 1.5 specific gravity stabilizer vent gas, accompanied by twofold increase in volume of raw gas. Under different conditions 600 cubic feet of ethylene plus 1.1 gallons of aromatics are obtained per 1,000 cubic feet of raw gas, accompanied by 50 per cent increase of gas volume. Similarly butanes would show yields and expansion ratios about 30 per cent higher.

The recovery of products from cracked gas and the bearing of the experimental and other findings on the possibility of commercial large scale production of aromatics and ethylene are discussed.

In the past five or six years unusual interest has been manifested in the possibility of commercial production of more valuable compounds such as unsaturateds and aromatics by cracking the lower molecular weight hydrocarbons occurring in natural gas, refinery gases and in petroleum, namely, methane, ethane, propane and butanes. Undoubtedly this interest is due to the fact that within the same period of time overproduction of petroleum and natural gas has caused, in many localities, tremendous and continued waste of unmarketable excess natural gas and highly volatile fractions, such as stabilizer vent gas. From all present indications, the latter situation has not improved especially in the case of the intermediate hydrocarbon fractions, mixtures of ethane, propane and butanes, which are a drug on the market despite the rapid development of the liquefied gas industry. An economical process for the conversion of stabilizer vent gas and for the excess butanes now blended with natural gasoline would be of benefit to the petroleum industry, as providing new outlets for its products now either wasted or sold as the cheapest of fuels.

That methane, ethane, propane, butane and hydrocarbons of similar molecular weights, are susceptible to "cracking" to form less saturated and aromatic compounds has been well known as far back as 1863 when Berthelot[1] made a study of the products from the thermal decomposition of methane, ethane, ethylene and acetylene. Since Berthelot a large number of investigators, including Bone and Coward, Zanetti, E. H. Leslie, J. G. Davidson, Fischer, Stanley and Nash, Hurd, Pease, Frey, H. M. Smith, Haynes Curme, Williams and Gardner, Wheeler and numerous others have done experimental work on the thermal decomposition of the simpler hydrocarbons. While the total literature on the thermal decomposition of the normally gaseous hydrocarbons is but a small fraction of the literature on the cracking of petroleum crude and its fractions, yet it is sufficiently voluminous to preclude any attempt to review it in detail in this article. The reader is referred to "The Pyrolysis of Carbon Compounds"[2] by Hurd, pp. 46-48, for a comprehensive review of the technical literature on this subject from Berthelot's time up to the beginning of 1929. Stanley[3] and Stanley and Nash[4] present a very interesting account of recent experiments on the thermal decomposition of methane from the standpoint of possibility of commercial use. Burrell[5] similarly discusses natural gas as a commercial source of benzol.

To date, however, there is no published account of any successful commercial process for the cracking of high methane containing gas for aromatics. It is known that one company is successfully cracking ethane and possibly heavier hydrocarbons to produce ethylene. There is also no record of any successful process for the maximum production of aromatics from either methane or ethane-propane-butane mixtures. The process of "reforming" natural gas into lower heating value gas more suitable for distribution, as practiced on the Pacific Coast, is not suitable for recovery of by-products.

Commercial Possibilities

The present investigation was undertaken to determine the possibilities of commercial cracking of stabilizer vent gas and possibly of natural gas and to develop suitable equipment and processes for this purpose. Before proceeding with experimental work, a critical study was made of all recorded publications and patents of interest in this connection. The results of this study of the literature may be summarized as follows:

1. Previous investigators have lacked adequate analytical methods to determine the composition of the highly complex cracked gases produced. Their analytical results are often misleading and of little assistance in estimating the probable maximum yield of individual olefins or of aromatics, either in the laboratory or on a commercial scale.

2. It has been shown both by rigorous thermodynamical reasoning and by experiment[4] that above 400° C., and given sufficient time, all hydrocarbons revert to a mixture of carbon, hydrogen and methane in equilibrium. The cracking of hydrocarbons to yield other products than carbon, hydrogen and methane can never therefore be anywhere near equilibrium and the time element, i.e., time of exposure to cracking temperature, is of great importance. As in the cracking of oil[1], very short heating periods would be indicated for maximum yield of valuable products, and the least formation of hydrogen and methane. It also follows less directly that because of the complexity and sensitivity of the reactions taking place, experimentation on commercial production should be done in semicommercial scale equipment, rather than in totally different laboratory equipment.

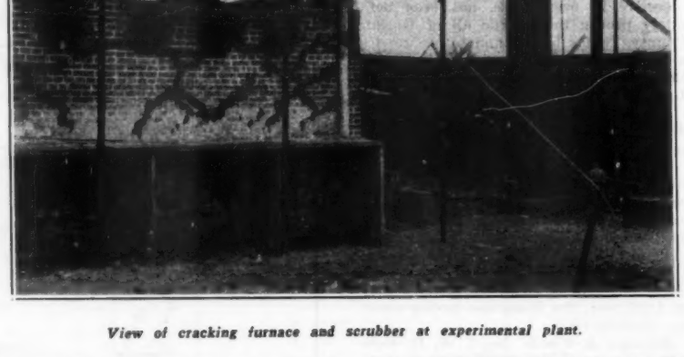
3. Yield and quality of desired products are very sensitive to changes in cracking temperature, period of heating at cracking temperature, uniform heating, etc. Close control of temperatures and of gas velocity is therefore desirable and a continuous rather than an intermittent process indicated. Pressure has little effect on the process except as it affects time of heating at cracking temperature.

4. The cracking of methane takes place at temperatures between 1,000° C. and 1,200° C. This temperature range is too high for any commercially available metal or metal alloy and ceramic refractories must be used. The cracking of ethane and higher molecular weight hydrocarbons takes place at temperatures below 900° C.; this temperature is far too high to permit the use of steel or calorized steel tubes and requires the very best available high heat resistant metal alloys. Despite a great deal of research work to find catalysts to lower the cracking temperatures, none have been found except catalysts promoting the formation of carbon and hydrogen.

Design of Experimental Plant

On the basis of the survey of literature and patents as summarized above, and guided by the author's previous experience in experimental large-scale cracking of natural gas and its fractions, a continuous tube-type furnace and plant were designed and constructed (photograph Figure 1). The furnace consists of radiant and convection sections with a plurality of burners to make possible accurate control over the temperatures in all parts of the furnace. Only a single tube coil was used for the experimental work in order to eliminate all difficulties and uncertainties as to results which would be introduced by manifolds or headers. The furnace itself was actually large enough to accommodate several such complete coils if required. Iron-constantan thermocouples were located at several points in the tubes and furnace, as indicated in the diagram, and connected to a six-point potentiometer recorder. Orifice meters were provided on the intake line to the furnace tubes, to the burner supply line and to the cracked gas line going to the torch. The piping and valves were so arranged that either a natural gasoline plant residue gas or stabilizer vent gas could be supplied to either the cracking coil or to the furnace burners. One-fourth-inch sampling lines led from the cracking coil return bends to the laboratory building.

The outlet of the last pass through the furnace was connected to a water spray type cooler and scrubber through a short water spray cooled iron pipe con-



View of cracking furnace and scrubber at experimental plant.

Note: The equipment and processes developed in this investigation are covered by pending U. S. Patent applications.

TABLE 1—TYPICAL ANALYTICAL AND OTHER DATA FOR EXPERIMENTAL GAS CRACKING RUNS

	Composition raw gas						Specific gravity of raw gas	Cu. ft. per day of raw gas	Temperature cracked gas at outlet, °F.	Composition cracked gas							Additional condensate in scrubber in gals. per 1,000 cu. ft. cracked gas	Specific gravity of raw gas	Cu. ft./ day of cracked gas	Expansion ratio of cracked to raw gas	Total gallons aromatics per 1,000 cu. ft. raw gas	Ratio of hydrogen plus methane to ethylene
No.	CH_4	C_2H_6	C_3H_8	(iso) C_4H_{10}	(n-) C_4H_{10}	C_5+				H_2	CH_4, N_2, O_2	C_2H_4	C_2H_6	C_3H_6	C_3H_8	C_4—	C_5—+					
1	4.8	16.2	33.4	1.4		0.1	1.434	14,700	1,500	5.9	54.09	26.92	4.60	6.77	1.36	1.36	0.2	.769	27,400	1.862	.99	2.22
2	4.8	16.2	33.4	1.4		0.1	1.434	15,500	1,500	3.4	54.7	28.2	4.1	6.7	1.4	1.5	0.2	.784	28,300	1.835	1.06	2.06
3	1.7	9.5	76.3	10.0		....	1.540	19,000	1,550		45.4		26.8	6.4	19.1		2.3	...	.901	33,470	1.709	....	1.695
4	2.2	10.2	....	87.6		....	1.452	20,000	1,525		42.5		26.0	6.2	23.4		1.9	...	.955	30,400	1.520	....	1.63
5	2.1	10.0	76.2	6.4	5.1	0.2	1.518	17,700	1,650	Trace	60.9	10.9	6.8	5.6	1.7	2.1	0.3	.766	35,000	1.980	1.6	....
6	2.1	10.0	76.2	6.4	5.1	0.2	1.518	15,650	1,740	0.6	78.7		14.8	1.3	1.0	+3.6	0.3	.720	33,000	2.110	2.7	....
7	16.4	4.0	61.2	10.1	8.2	0.1	1.446	11,520	1,650		80.0		10.2	5.2	1.6	+3.0	0.3	.694	24,400	2.120	2.3	....
8	77.6	6.9	10.1	4.8		0.6	0.770	20,300	1,650		91.1		6.4	0.9	0.5	1.1	0.1	.615	26,400	1.250	.5	..

nection. After being cooled and cleaned of soot and tar particles in the scrubber, the cracked gas passed out of the plant to a high torch where it was burned. Provisions were made to by-pass a portion of this cracked gas, whenever required, to the compressor house where it could be compressed to 250 pounds at 32° F. in a small two-stage compressor. The resulting condensates were collected in a 50-pound and a 250-pound accumulator, respectively, and saved for analysis or for blending tests. The compressor and a dynamo-generator to supply current for lights and for the temperature recorded were run by a small gasoline engine. Provisions were also made for entering either superheated steam or compressed air to the cracking coil.

The laboratory was equipped with a specific gravity gas balance, an Orsat apparatus for testing furnace gases, and with suitable sample containers.

While the maximum capacity of the furnace was later found to be about 25,000 feet per day with a single cracking coil and while it could have been increased to a capacity of 100,000 feet per day by adding more coils, it was not considered necessary or advisable to install equipment to recover the products in the cracked gas such as ethylene and aromatics respectively. As will be shown later in the article complete and dependable analyses were made of the cracked gas. Recovery equipment for the products in the cracked gas would be of a more or less standard nature. Therefore, the only recovery of products attempted was the production of several drums of low-stage and high-stage aromatic condensate for blending tests and for samples. Attention was concentrated entirely on the cracking part of the process. It should be noted here that the cracking coils tried out were designed and constructed as for full-size commercial equipment so that the experimental data gathered might be directly applicable to the design of a larger plant.

Experimental Procedure

The experimental procedure consisted of passing either residue or stabilizer vent gas through the furnace at various rates, and at various cracking temperatures; samples being taken of the raw gas and of the cracked gas when the desired operating conditions for a particular run were secured and held steady. With every cracked gas sample, complete observations were made of meter readings, temperatures, etc., including usually a determination of the specific gravities of the raw and cracked gases. Usually also a portion of the cracked gas was compressed to 250 pounds at 32° F., and a gallon or two of low-stage and high-stage aromatic condensate secured for analysis. The samples were then completely analyzed in the author's laboratory by a combination of fractional distillation analysis and other methods, as described in a previous article.[5]

The expansion of the raw gas during cracking was determined in three ways: (1) from meter readings of raw and of cracked gas, (2) by calculation from specific gravities of raw and of cracked gas as determined by specific gravity balance, and (3) by calculation from specific gravities of raw and of cracked gas as calculated from their respective analyses. Of the three methods, the third was found more dependable than either of the first two; chiefly, because both the meter on the cracked gas line and the specific gravity gas balance had a tendency to foul, due to occasional shortage of water supply to the scrubber which in turn permitted tar fog to go out into the cracked gas line.

A series of experimental runs were made in such manner that only one of the following important variables was varied at a time, the others remaining constant:

1. Composition of raw gas.
2. Dimensions of alloy tubes in radiant section.
3. Material of alloy tube in radiant section.
4. Outlet gas temperature.
5. Actual time during which gas was exposed to cracking temperatures.
6. General conditions in furnace such as distribution of radiant heat and convection heat, regulation of temperature gradient throughout length of furnace, and character of furnace atmosphere.

TABLE 2—A.S.T.M. DISTILLATIONS OF AROMATIC CONDENSATE BLENDS

	0% blend	10% blend	20% blend	30% blend	40% blend
Gravity A.P.I. at 60° F.	60.9	57.2	54.2	49.7	45.4
Specific gravity at 60° F.	0.7355	0.750	0.762	0.781	0.800
Initial boiling point, 0%	96	92	94	94	95
5 per cent	122	120	126	128	133
10 per cent	138	138	142	146	151
20 per cent	172	172	176	178	183
30 per cent	213	208	208	206	206
40 per cent	253	240	240	231	227
50 per cent (middle point)	286	276	274	264	260
60 per cent	316	308	310	300	294
70 per cent	337	332	332	328	324
80 per cent	354	352	353	349	348
90 per cent	376	375	375	376	376
95 per cent	400	397	406	404	404
Endpoint, 100 per cent	412	416	424	428	418
Distillate recovered	97½	97½	97½	97½	98

The period of experimentation lasted about 14 months from the time of completion of the plant. During this time a variety of heat resistant alloy tubes were purchased and run till complete failure, in order to determine their life under the most severe operating conditions likely to be used in the process. To secure a maximum yield of benzol-and-heavier aromatics from stabilizer vent gas, it was necessary to heat the gas up to an outlet temperature of 1,650° F. or higher, up to 1,750° F. At such temperatures most of the alloy tubes rapidly failed due to oxidation on the outside of the tube and strong carbonization amounting almost to slagging on the inside (due to the carbon deposited from the cracked gas).

Apparently these temperatures while low for nonmetal refractories such as carborundum, clay, etc., tested the best available alloys to the utmost, with some doubt as to whether metal tubes would have sufficient life to warrant their cost. However, the use of ceramic materials meant either an intermittent regenerator type of furnace or else costly ceramic tubes with their serious disadvantages of porosity, low heat conductivity and fragility in service. It was therefore decided to use special composition high heat resistant alloy tubes and to "humor" them to the limit in the design of the furnace and in the operating conditions.

"Humoring" Tubes

The "humoring" consisted in careful control of furnace atmosphere, in the application of radiant rather than convection heat to the last alloy tube pass through the furnace, in the regulation of the temperature gradient in the radiant section so as to keep the wall temperature of the outlet end of the coil down, and in greatly increasing the velocity of gas through the coil. This increase in velocity was also in the direction of increased yields of aromatics and ethylene. Close control was maintained over all operating conditions at all times in order to avoid momentary rises in temperature.

By using the special alloy metal tubes and by careful control of furnace conditions, as outlined above, and with the use of high gas velocities, a material improvement was secured in the all important life of the high-temperature reaction tubes. Also, the cause of the tube failure was no longer primarily oxidation or carburization of the tube metal but progressive "creeping" and embrittlement due to alternate heating and cooling of the furnace between temperatures of 80° F. and 1,650° F. to 1,760° F. (cracking temperature), rendered necessary by frequent changes and repairs in the furnace and to fluctuations in or lack of fuel supply. As a result of such violent treatment the tubes tended to bow strongly and when they were straightened usually one or more cracks or even fractures would develop. However, welding with rods of the same alloy as material of tube was found satisfactory and the tube could be repaired and used again.

From the above experiments it was concluded that in a commercial plant the life of the reaction tubes should easily run into many thousands of hours at cracking temperatures required for maximum aromatics. Cracking for maximum ethylene yield takes place at lower temperatures and tube life would therefore be greatly lengthened. In a commercial large scale plant, provisions should be made for rapid and easy replacement of tubes without undue interruption of production.

Formation of Carbon

The formation of carbon has been a bugbear in all cracking processes whether of oil or of gas. The tubes gradually become obstructed with carbon, which, if not removed, causes local overheating and high pressure drop through the cracking coil. Either superheated steam or air was found satisfactory for periodical "blowing" of the tubes. However, at high gas velocities through the tubes, the formation and deposition of carbon on the tube walls was very materially lessened to the extent that the tube had to be blown only about once every 8 to 12 hours; the carbon deposit was fairly light and fluffy and the "blow" usually took only about 15 minutes. Similarly, at high gas velocities, the formation of hydrogen was almost entirely suppressed, usually to below 5 per cent. This suppression of hydrogen formation is at variance with previous work, and it was therefore very carefully and repeatedly checked up by all available analytical methods including the partial oxidation of the methane-hydrogen fraction over CuO as used by previous investigators.

The cracking of high methane containing residue gas from a natural gasoline plant gave low yields of products at the highest cracking temperatures used and was therefore discontinued early in the course of the investigation. Thereafter only stabilizer vent gas was experimented with in order to thoroughly investigate the effect of varying operating conditions on the yield of products and especially to find the proper conditions for maximum yield of (a) aromatics and (b) ethylene. It was found that ethylene was the predominant olefin formed in cracking. The yield of aromatics and of ethylene was a function of both the cracking temperature and time of heating at cracking temperatures. For both aromatics and for ethylene, the maximum yields were obtained within a narrow temperature range, namely 1,650° F. to 1,700° F. for aromatics, and 1,500° to 1,550° F. for ethylene. While the complete report of the runs would be too lengthy for this article, the data and analyses for typical runs are given in Table 1.

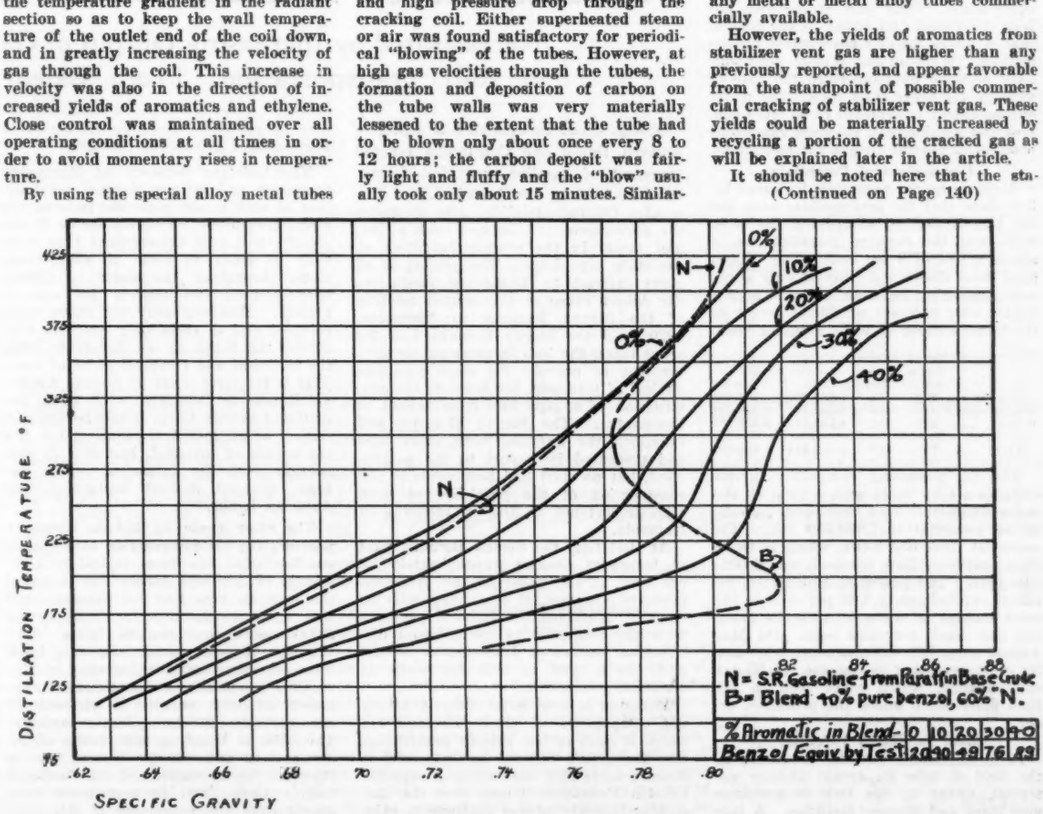
It will be noted in the cracked gas analyses given that hydrogen, methane, ethylene, ethane, propylene, propane, butenes and butanes (determined separately in other runs) and liquid hydrocarbons are always present although of course in varying proportions. The corrections for condensate were conservatively estimated from the condensate accumulated in the scrubber, during runs at a particular cracking temperature.

The cracking of high methane gasoline plant residue gas shown in Run No. 8 of Table 1 yields only 0.5 gallon of benzol and heavier per 1,000 cubic feet of raw gas, and does not appear very promising for commercial production. From previous work done in laboratory quartz-tube furnaces a cracking temperature of about 2,000° F. is required for highest yields, which is far too high for any metal or metal alloy tubes commercially available.

However, the yields of aromatics from stabilizer vent gas are higher than any previously reported, and appear favorable from the standpoint of possible commercial cracking of stabilizer vent gas. These yields could be materially increased by recycling a portion of the cracked gas as will be explained later in the article.

It should be noted here that the sta-

(Continued on Page 140)



Fractional gravity distillation curves and benzol equivalents of aromatic blends.

Comprehensive View of a Great Field

Oklahoma City Area Reviewed as to Its Present Status, Possible Potential Production and Ultimate Production

By W. A. Spinney

The potential of the Oklahoma City Field taken in April and compared to the one taken in January indicates that the Arbuckle lime zone, the first to be discovered in the field, if allowed to produce to capacity, would be finished for flush production in a few weeks. The Johnson, Green shale. Hoopes and School Land, or intermediate zone, would have a rapid water advance, the flowing life of the wells would be short, and the water would probably eliminate profitable operation of the air-gas lift method, necessitating pumping operations.

The Wilcox sand area has excellent oil and gas production possibilities and when it quits producing naturally is expected to maintain a large production by the air-gas lift method. The total productive area is small and heavy production might soon cause a rapid decline.

The Arbuckle lime is believed to have produced approximately 90 per cent of its recoverable oil content. All the wells are producing a large quantity of water.

The Johnson, Hoopes and School Land sand zone has probably produced about 40 per cent of its recoverable oil content. Lowered fluid levels with water from both the Stamper and edge zone all indicate that the rated potential of 2,000,000 bbls. in 24 hours in this zone is artificial.

The Wilcox sand is credited with a probable recovery of about four times the average per acre recovery of the two other zones. Only part of the area has been developed, and about 15 per cent of that is where the city government forbids drilling. Wells in the Wilcox sand zone have declined only one-third the rate of wells in the other sand zone. The water encroachment is expected to be more general and regular, and the sand conditions promise successful air-gas lift operations.

Comparison of Potentials

A report on the potentials indicated below show that the intermediate zone has the largest decline, comparing the same wells with the January potential test, it shows a loss of 6 per cent. The Wilcox sand zone shows a decline of only 2 per cent comparing the same wells. The Arbuckle zone was not considered owing to the large number of wells plugging back.

	Total wells April	Wells gauged Jan.	Potentials Jan.	Potentials April
Arbuckle ..	122	34	165,490	104,458
Intermediate	430	327	2,416,132	2,046,621
Wilcox	211	141	4,302,332	5,713,580
Total	763	502	6,883,954	7,864,659

The 51 producing companies in the Oklahoma City Field with a total of 763 wells completed have developed an estimated potential of 7,864,659 bbls. The potential from 553 wells, which is based on a four-hour flow per well, was 6,702,319 bbls. The potential production declined approximately 4.80 per cent on the same number of wells between the January and April potential tests. On May 1 there were 733 wells on production and 30 wells were shut in, serving the 65-day shut-in time, which every well in the field must serve under the proration order.

Real vs. Rated Potential

It is impossible for the producers in the field to take an actual 24-hour potential, owing to the lack of adequate pipe lines and storage facilities. A fair potential of any field permits all the wells to produce full production under customary conditions and methods, and permits the entire field to produce on full production in the same manner, at the same time. Some express the opinion that opening up and producing 5 per cent of the total completed wells in the Oklahoma City Pool for one-sixth of a day, with the remainder of the wells shut in, results in a potential of at least 10 times the real potential. In all probability many of the wells would only flow for a few hours. A survey of the proven area in that field, checking the different sand conditions, the water encroachment, and the decline in production will tend to give a better picture of the real conditions. The decrease in the allowable production (for an example, the allowable rate at the present time is only 10 per cent of the amount 10 months ago) has extended the allowable flowing period of the different zones several months and allowed only a small drainage.

Production Record

The following table gives the estimated number of acres productive from the different horizons, number of wells, estimated ultimate recovery per acre, production to date, May 1, possible production and the estimated future production.

	Arbuckle	Johnson and School Land sand	Wilcox	Total
Number of acres	1,700	4,400	3,300	9,400
Producing wells	122	430	211	763
Estimated production per acre	13,500	15,000	50,000	*27,000
Production to date	19,250,000	25,000,000	12,232,000	56,482,000
Possible production	22,950,000	66,000,000	165,000,000	253,950,000
Estimated future production	3,700,000	41,000,000	152,768,000	197,468,000

*Estimated average.

The restricted area inside the city limits is estimated to have 27,500,000 bbls. of oil that will not be recovered, unless restrictions are removed.

According to the above estimate, the Arbuckle lime zone has produced nearly 85 per cent of its total recoverable oil content. Some of the wells producing from this formation are making about 98 per cent water, and 50 out of a total of 122 have already been plugged back in attempts to shut off the water, which was effective in only a few cases. Attempts to use the air-gas lift on wells making thousands of barrels of water is a problem and operation of these on the present crude market would not be profitable except on a few of the wells located high on the structure which still make enough oil to operate successfully. It is estimated that the production from the majority of the wells will only return the cost of operation and will not allow a profit.

Drilling Restrictions

The Johnson and School Land sand zone which comprises the largest area in the field is protected on the north by a ruling of the city commission, which will not allow any drilling permits north of U-7 zone, in the north end of the field, north of the M.K.&T. railroad tracks, which will eliminate an area estimated to be approximately 200 acres, all considered to be productive.

The area where the "gasoline" wells are found, estimated to cover 800 acres, which some operators believed would blow into oil later, has declined in pressure. The gas area is a strip part way around the field, only one location wide. Some express the opinion that improperly cased wells allowing the Prue sand gas to repressure the oil horizon was the principal cause of the April decline in potentials from these formations. The Johnson and School Land sands varies in porosity, often being dolomitic and tight, leading many to believe the water encroachment is irregular, being slow in tight areas, and fast in narrow, porous sand areas. If the oil is taken out faster than the water can encroach, the gas can broaden out and fill the gap temporarily, until the smaller rate of oil recovery allows the water to more closely follow the oil. Very few believe the area where the "gasoline" or high gravity oil was found will ever produce any appreciable amount of oil of the average grade. The sand conditions in the Johnson and School Land zone vary rapidly, showing a difference of capacity per acre from 40,000 bbls. to 5,000 bbls., due to the sand being tightly cemented by dolomite. Often it changes in wells a few locations from large producing wells. It is be-

(Continued on Page 127)

Rumania to Build Gasoline Pipe Line

Necessitated by Increasing Output of Gasoline and Costs of Rail Transportation. From Baicoi to Constantza

The proposal to construct a pipe line between Baicoi and Constantza for the transport of gasoline was first formulated in 1926 by the Association of Rumanian Oil Industrialists, who requested the government to construct such a line, and assist in the commercialization of the state pipe lines. The project is of great interest to Rumanian producers. Sir Albert Stern at the annual meeting of the Steaua Romana in December, 1929, said the Steaua Romana had for years taken the lead in pressing the government to provide the most economic method of transport for benzine, the construction of a pipe line from Baicoi to Constantza. The Steaua Romana had examined the question with great care and presented its report to the government, but no start had been made in the construction of the pipe line of such vital importance to the oil industry of Rumania.

At that time the Steaua Romana paid in transport charges approximately 22 per cent of the value of the crude oil produced; in fact, it cost practically as much to transport the finished products from the refineries to the internal distributing centers of Rumania or to the ports as it cost to drill the wells to maintain production.

Rumania is now being severely hit by the competition of cheap Russian oil, which is more or less rapidly penetrating into Rumania's natural markets, and it becomes more and more obvious, says the London Petroleum Times, that the Rumanian industry cannot continue to exist unless some form of cheap transportation is provided from the refineries to the seaboard and to the Danube.

The insistent demands of Rumanian producers and refiners for the construction of such a new pipe line induced the Regia Autonoma a Conductelor de Petrol ale Statului (the Government Pipe Line Co.) to apply to some 25 engineering firms throughout the world to submit specifications and tenders for such a project. However, only six offers were received and of these only one was considered as being at all favorable from the technical and financial point of view. This is the offer made by Societe Anonyme Roumaine Conducta, with whom the National Supply Corp. is collaborating in respect of all technical requirements and the supply of material, and also in connection with the financing, which has been arranged through Rumanian and Austrian banks.

The offer made by S.A.R. Conducta provides for the construction of a special gasoline pipe line from Baicoi to Constantza which will follow the route of the existing pipe line for kerosene and will have a capacity for transporting 2,000 metric tons per 24 hours. The original proposal provided for only 1,000 tons per day, but the increase in Rumania's production and anticipated augmentation have rendered it advisable to construct the line for a larger capacity. The offer is based on the results of investigations and surveys carried out in Rumania by specialists of the National Supply Corp., and in accordance with the practice and experience of this company in the supply and construction of various important pipe lines in the United States.

Cost Out of Earnings

The offer made by S.A.R. Conducta provides for the supply of all materials and execution of all work for the sum of $4,550,000. This amount will be payable over a period of eight years and at the very low rate of interest of 6½ per cent per annum, the first payment becoming due at the end of the second year. During the time necessary for shipping of the material and building the line, the Regia will have no payments to make and the interest due for that time will be capitalized in the cost of the work. Under this arrangement, the capital cost of the line will be paid for out of its earnings, so that under the scheme propounded Rumania will secure a most up-to-date and efficient gasoline pipe line free of all charges at the end of eight years, without any initial capital expenditure having had to be incurred, in addition to which the line will during the eight-year period have been earning money for the Regia in excess of the amounts required to pay for it.

The R.A.C.P. does not invest any capital in the pipe line whatever, and at the end of the eight years the line becomes the absolute property of the Regia, together with all its installations without any further charges except the running expenses for its normal operation.

At present gasoline is being transported to Constantza in railway tank cars, for which the rate is over 9,000 lei per car of 10 tons, a figure which cannot

(Continued on Page 127)

Compression and Transmission of Gas

Line Diameter and Compressor Spacing to Obtain Required Capacity Depend on Cost of Pipe and Character of Country

By P. McDonald Biddison
Consulting Engineer, Bastrop, La.*

SUMMARY

The paper deals with the question of minimum wall thickness, economical operating pressures, desirable compression ratio for compressor stations and spacing of compressor stations for natural gas transmission systems. On the assumption that the minimum pipe wall thickness will vary with pipe size, it is pointed out that the operating pressure will also vary with pipe diameter. It is developed that the minimum horsepower requirements for a given line will be obtained with a compression ratio of about 1.3 and that the selection of line diameter and compressor spacing to obtain required capacity are dependent on cost of steel pipe and character of country traversed.

The subject assigned is a broad one and all that will be attempted here will be to point out an approach to the determination of the economical use of compressor stations in natural gas transportation.

The writer has for many years used the following formula for the mean effective pressure of compression for natural gas:

(1) $m.e.p. = 6.38 \times p_o(n^{.35} - .98)$

where n = Compression ratio p_1/p_o
p_o = Inlet pressure, pounds absolute
p_1 = Outlet pressure, pounds absolute

This equation is empirical and was obtained by plotting the data from actual indicator cards, using also similar data reported by Herbert R. Davis in an early publication before the Natural Gas Association of America. The data from which the equation was derived were largely from compressor units of 1,000 to 1,300 rated horsepower. The volumetric efficiency of machines of this type appeared to be

(2) $E = .97 - .03n$

Combining equations 1 and 2 to obtain indicated horsepower per million cubic feet per 24 hours we get

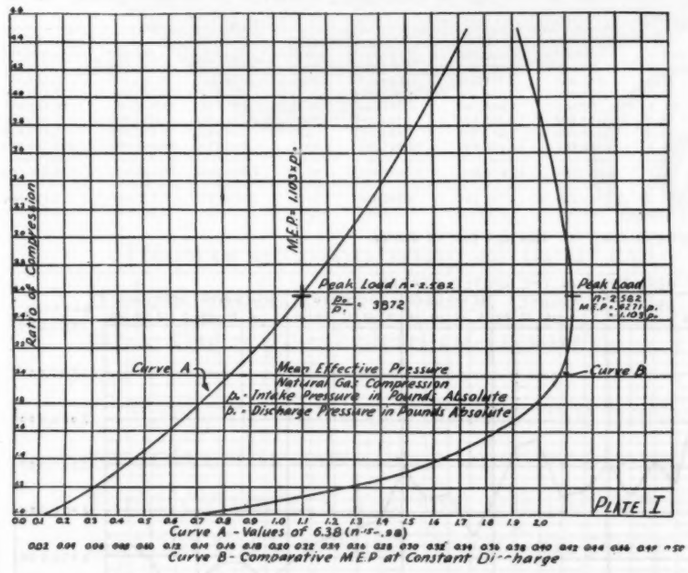
(3) $i.h.p. = 284.75 \times \dfrac{(n^{.35} - .98)}{.97 - .03n}$

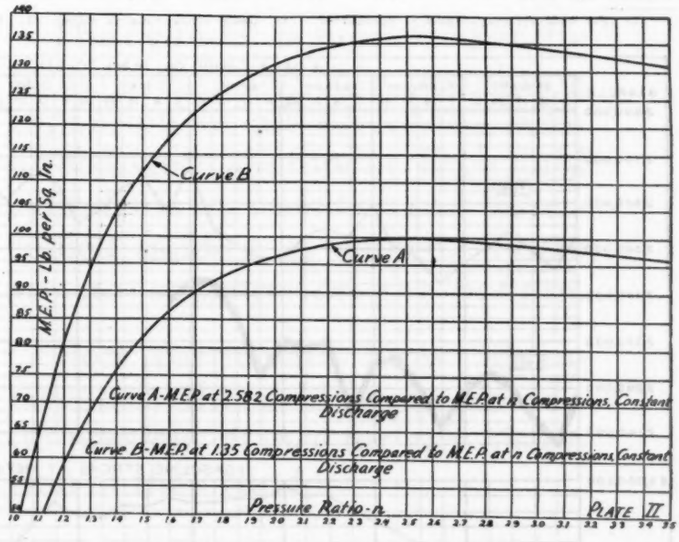
Equation 1 for mean effective pressure is plotted on Plate 1 as Curve A. This curve shows the relation of mean effective pressure to the compression ratio for any intake pressure. Choose a compression ratio (discharge pressure divided by intake pressure, both absolute pressures) on left hand scale and follow horizontally toward the right to intersection with Curve A, then vertically downward and read on the upper of the two horizontal scales the value of 6.38 $(n^{.35} - .98)$. This value multiplied by the absolute inlet pressure is the mean effective pressure corresponding to the compression ratio chosen.

In the same manner, on Plate 1 a factor may be found from Curve B, which multiplied by the absolute discharge pressure will give the mean effective pressure for any compression ratio.

From Curve B, on Plate 1, it may be noted that for any given discharge pressure the m.e.p. increases as the compression ratio increases (or as the intake pressure declines) until at about 2.582 compression ratio a maximum m.e.p. is reached equal to 0.4271 p_1 (p_1 being the discharge pressure), and after this point further increase in compression ratio (or further drop in intake pressure) produces a slight decline in m.e.p. This condition is common to the compression of all gases, but the compression ratio at which peak m.e.p. is developed is not the same for all gases, nor is the relation of m.e.p. to compression ratio the same for all gases. The data here given will apply fairly well to most natural gases in transportation systems, but casinghead gases may vary considerably from the equations here shown.

On Plate 2 is analyzed the effect of this peak compression ratio upon engine loads. Curve A compares the m.e.p. at a given discharge pressure and various compression ratios to m.e.p. at 2.582 compressions. An engine equipped with cylinders to produce rated horsepower for a given discharge pressure at 2.582 ratio could not be overloaded at any other ratio. At 1.5 pressure ratio for this same pressure it would only develop 82 per cent of rating, and at 3.5 ratio about 96 per cent of rating. If an engine be equipped with compressors which at 1.3 compressions would produce rated engine horsepower, the m.e.p. at 1.3 compressions would be 68.5 per cent of the m.e.p. at peak ratio of pressures for the same discharge pressure. (Curve A.) If the ratio became 1.5, requiring 82 per cent of the m.e.p. developed at peak ratio, then the engine at 1.5 compression ratio would have to develop $\frac{82}{68.5}$ or 119.5 per cent of rating to operate at rated pressures and 1.5 compressions. It is for the purpose of relieving overloads of this nature that volumetric clearances are sometimes provided to be connected to compressor cylinder ends. They reduce the mean effective pressure by increasing the volumetric clearance. Similarly, from Curve B an engine equipped with compressors to develop rated horspower at 1.35 compressions for a given discharge pressure would, at 1.5 compressions, be required to develop about 112 per cent of rating; at 1.2 compressions only about 80.5 per cent of rating.


M.E.P. = 1.105 p_1
Peak Load n = 2.582
p_2/p_1 = .3872
Peak Load
p = 2.582
M.E.P. = .4271 p_1
= 1.105 p_2
Curve A
Curve B
Mean Effective Pressure
Natural Gas Compression
p_2 = Intake Pressure in Pounds Absolute
p_1 = Discharge Pressure in Pounds Absolute
Ratio of Compression
PLATE I
Curve A - Values of 6.38 $(n^{.35} - .98)$
Curve B - Comparative M.E.P. at Constant Discharge


Curve B
Curve A
M.E.P. - Lb. per Sq. In.
Curve A-M.E.P. at 2.582 Compressions Compared to M.E.P. at n Compressions, Constant Discharge
Curve B-M.E.P. at 1.35 Compressions Compared to M.E.P. at n Compressions Constant Discharge
Pressure Ratio-n
PLATE II

For Indicated Horsepower

Equation 3 for indicated horsepower is plotted in solid lines on Plate 3. In dotted lines are shown the recent guarantees of a prominent manufacturer of gas compressors for comparison on compressors with different valve areas. The guarantees suggest that some revision of equations 1 and 3 to show smaller values of mean effective pressure and i.h.p., especially at lower compression ratios, would be warranted if the guarantees could be met in continuous operation. The comparison brings out rather vividly the advantages reaped from larger valve areas and lower valve pressure losses over designs available 20 years ago. Such error as exists is on the safe side. The relationship between compression ratio and horsepower per million being determinable as shown, we may investigate the problem of what is the economical compression ratio to use in pipe line design.

For any given line size and maximum operating pressure P

(4) $Q = K\sqrt{\dfrac{1 - n^2}{L - n^2}}$

where $\dfrac{p_1}{n} = p_2$

$K = 871 \times D^{2.667}$

Equation 4 is derived from formula of Thomas R. Weymouth for flow of gas in pipe lines as given in "Natural Gas Handbook," Diehl, 1927 edition.

For any given inside pipe diameter D, to maintain Q at a constant value, we may vary the length L between stations and adjust the ratio of compression n accordingly. Thus, comparing two plans of compressor spacing:

(5) $\dfrac{1 - n_1^2}{L_1 \times n_1^2} = \dfrac{1 - n_2^2}{L_2 \times n_2^2}$

(6) $\dfrac{L_2}{L_1} = \dfrac{(1 - n_2^2)n_1^2}{(1 - n_1^2)n_2^2} = \dfrac{1 - \frac{1}{n_2^2}}{1 - \frac{1}{n_1^2}}$

Now, if L be the length of sections between compressor stations corresponding to a compression ratio of 3.0 (n being equal to 3.0, for which value $1 - \frac{1}{n^2} = 0.8891$), then for any other length L between compressor stations

(7) $\dfrac{1 - 0.8891\,L_2}{L_1} = \dfrac{1}{n_2^2}$

(8) and $n = \sqrt{\dfrac{L_1}{L_1 - 0.8891\,L_2}}$

(Continued on Page 103)

*Before convention Natural Gas Department, American Gas Association, Memphis, Tenn., May 11-14.

Big Record in Pipe Line Construction

Remarkable Achievements of Ford, Bacon & Davis in Engineering Division of the Petroleum Industry. Facts About the Firm

By A. E. Mockler
New York Bureau, The Oil and Gas Journal

NEW YORK, May 11.—Outstanding developments in the modernization of natural gas transmission and distributing lines during recent years, as well as the substantial increase in crude oil pipe line transmission and the extensive utilization of pipe lines as gasoline carriers, have centered the interest of the petroleum and natural gas industries on the growing prominence of Ford, Bacon & Davis, Inc., in the petroleum and natural gas engineering fields.

Many of the announcements of outstanding pipe line construction projects in recent years have carried the statement: "The new line will be surveyed, engineered and constructed by Ford, Bacon & Davis, Inc., which will also construct the compressor stations."

While the name of Ford, Bacon & Davis, Inc., is familiar to the petroleum industry, oil men in recent years have been showing a growing curiosity regarding the background and personnel of this organization, which has attained such a commanding place in the engineering division of the industry. To answer the growing query, "Who are Ford, Bacon & Davis, Inc.?" The Oil and Gas Journal correspondent this week obtained some interesting data on the background and rapid growth and outstanding engineering feats of that organization.

Ford, Bacon & Davis was first organized as a copartnership in 1894 at Philadelphia by Frank R. Ford, George W. Bacon and George H. Davis, three young engineers just out of college. Offices were later established, with New York as headquarters, in New Orleans, San Francisco and elsewhere, through which a business in public utilities with a yearly turnover of over $50,000,000 was built up in the first 15 years of operation. The business was incorporated in 1922.

First Prominence

The firm first came into prominence in the natural gas industry in 1905 when it assisted in the formation of the United Railways Investment Co., the management of which it directed, which acquired from George H. Westinghouse and associates control of the Philadelphia company, conducting at that time the largest natural gas business in the United States. Under the new management the natural gas business was expanded threefold and net revenues of approximately $4,500,000 were developed from the merchandising of some 35,000,000,000 feet of natural gas annually.

In 1920, Ford, Bacon & Davis was retained by the Standard Oil Co. of New Jersey to make a survey and valuation of its natural gas properties. Its report formed the basis of applications for revisions in gas rates in Pittsburgh, Cleveland and elsewhere. The association between Ford, Bacon & Davis and the New Jersey company has remained uninterrupted since that time, the former conducting numerous projects for the New Jersey company and its subsidiary and affiliated companies, and supplementing the engineering department of Standard of New Jersey in other operations.

Built Edmonton Line

One of the earlier natural gas projects undertaken by Ford, Bacon & Davis, Inc., was in 1923, when it was retained by the Northwestern Utilities, Ltd., of Edmonton, Alberta (then a subsidiary of International Utilities Corp.), to design, construct and operate a natural gas pipe line system extending from the Viking gas field in Alberta to Edmonton, the most northerly large city on the North American continent then without gas service. Construction of the Edmonton line was started in the early summer of 1923 and the line was finished late in October of the same year. The main line was 77 miles long, and the project included the development of the Viking Field, construction of the main transmission pipe line and a distributing system in Edmonton. The entire project involved between $4,000,000 and $5,000,000 and Ford, Bacon & Davis, Inc., operated the system initially after its completion, and turned over to the owner company a thoroughly trained operating personnel with an outstanding record of domestic gas sales per capita.

Brought Gas to New Orleans

Another major project was the Interstate Natural Gas Co., Inc., and South-

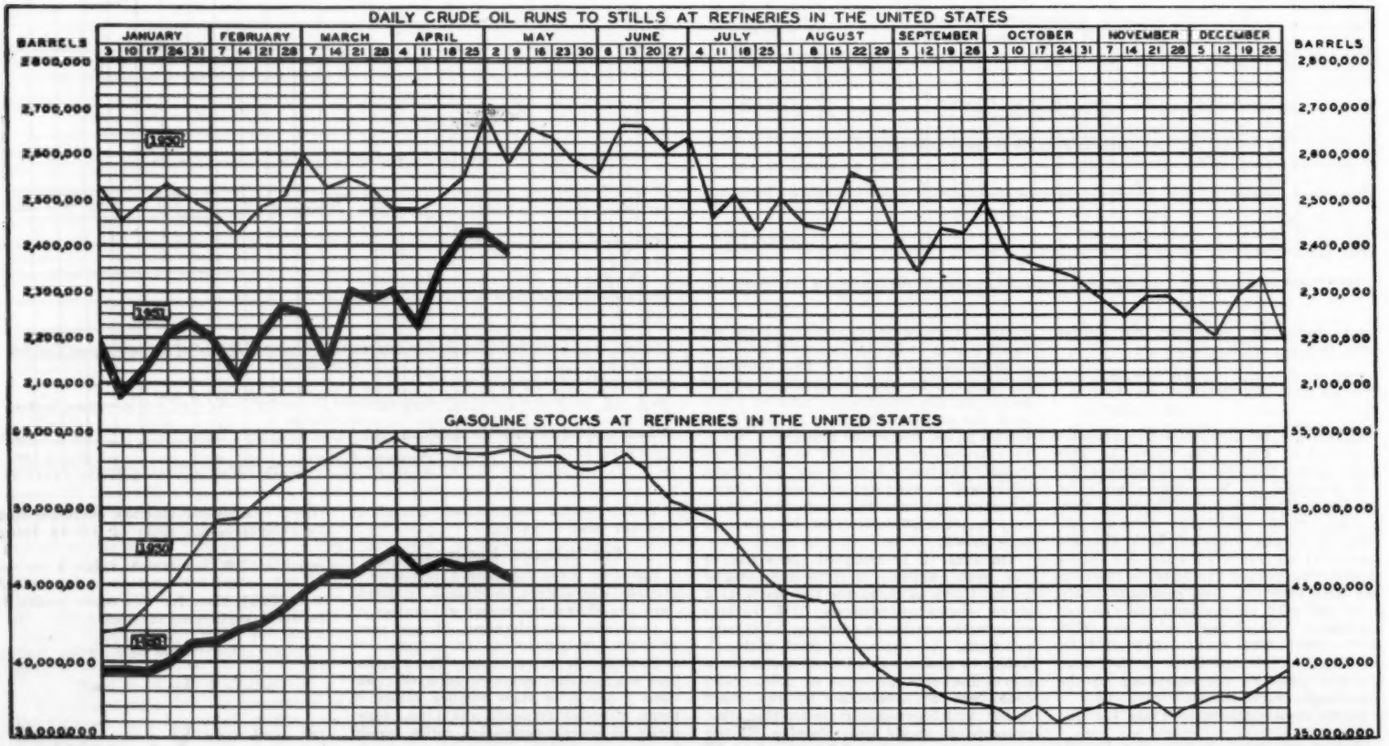
(Continued on Page 120)

AMERICAN PETROLEUM INSTITUTE WEEKLY REFINERY STATISTICS

The weekly report made to the American Petroleum Institute on refinery statistics—crude runs to still, gasoline stocks and gas and fuel oil stocks in barrels—for the week ending May 9.

	Week ending May 9				Week ending May 2, 1931				Week ending May 10, 1930			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
East Coast	100.0	442,100	8,716,000	8,375,000	100.0	455,000	8,453,000	8,027,000	100.0	475,285	9,246,000	6,906,000
Appalachian	93.8	72,100	1,691,000	1,115,000	93.8	77,600	1,772,000	1,203,000	89.1	91,571	1,788,000	760,000
Indiana, Illinois, Kentucky	97.5	336,900	6,317,000	3,622,000	97.5	333,000	6,191,000	3,589,000	99.5	334,857	8,553,000	3,751,000
Oklahoma, Kansas, Missouri	89.4	277,300	3,541,000	4,135,000	89.4	279,400	3,650,000	4,017,000	89.1	303,857	4,455,000	4,183,000
Texas	91.9	539,300	7,716,000	9,219,000	91.9	552,400	7,976,000	8,701,000	90.8	630,428	7,942,000	10,132,000
Louisiana and Arkansas	98.3	162,300	2,304,000	2,385,000	98.3	159,600	2,305,000	2,299,000	96.8	171,285	2,615,000	1,985,000
Rocky Mountain	93.1	53,300	1,876,000	826,000	93.1	49,900	1,847,000	824,000	93.6	59,285	2,743,000	1,083,000
California	98.8	443,100	13,649,000	98,451,000	98.8	492,400	13,419,000	98,977,000	99.3	593,714	15,861,000	108,149,000
Total United States	95.7	2,326,400	45,810,000	128,128,000	95.7	2,399,300	45,613,000	127,637,000	95.6	2,660,300	53,203,000	136,949,000
Texas Gulf Coast	100.0	405,600	6,612,000	6,654,000	100.0	410,900	6,798,000	6,205,000	100.0	478,571	6,725,000	7,413,000
Louisiana Gulf Coast	100.0	114,400	2,155,000	1,407,000	100.0	104,700	2,140,000	1,300,000	100.0	117,428	2,221,000	1,111,000

(1) Per cent refinery capacity represented. (2) Daily crude runs to stills. (3) Gasoline stocks. (4) Gas and fuel oil stocks.



**Data for 1931 based on weekly reports of the American Petroleum Institute. Figures for last week not shown in graph but are included in above tables.*

Only TRANSIT HOT OIL PUMPS have this Construction

Improper mounting of fluid cylinders on hot oil pumps is responsible for a great deal of trouble.

Early in our experience, we had to solve the problem of mounting fluid cylinders on hot oil pumps, so that they would "float" in their mountings.

The illustration above shows how we have solved the problem.

The cylinder is supported at the center line of the bore, permitting expansion in all directions with no change in alignment. Each fluid cylinder is mounted on two water-cooled saddles as shown. There are no supports on the bottom.

Note particularly how advantageously the saddles are placed—no possible chance for any distortion of the cylinder.

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Tulsa
Houston

NATIONAL TRANSIT
PUMP & MACHINE CO.
OIL CITY, PA.

New York
Philadelphia
Cleveland
Pittsburgh

TULSA and MID-CONTINENT FIELD
Frick-Reid Supply Corporation

NEW ORLEANS, LA.
Woodward, Wight & Co.

SALT LAKE CITY, UTAH
F. C. Richmond Machinery Co.

LOS ANGELES
Republic Supply Company of California

BEAUMONT, TEXAS
E. L. Wilson Hardware Company

PHOENIX, ARIZ.
Pratt-Gilbert Co.

ST. LOUIS, MO.
Reeves & Skinner Machinery Co.

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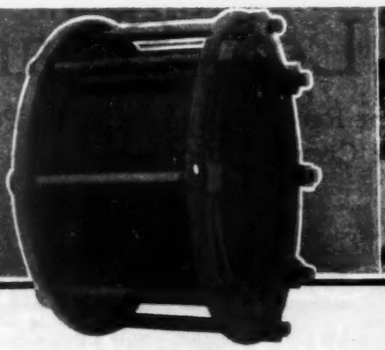

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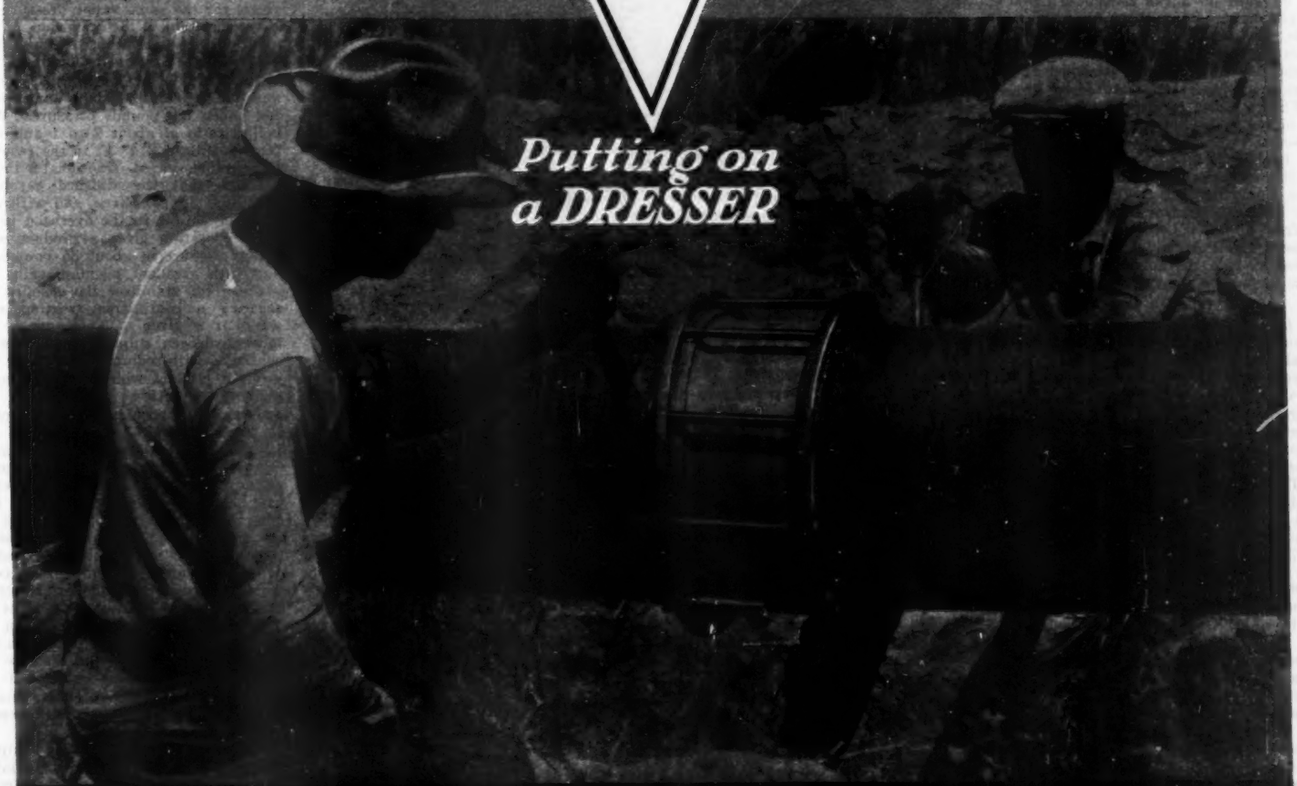


Putting on a DRESSER

DRESSER COUPLINGS *Dominate!*

Operate With Low Steam Consumption

New Gasoline Recovery System at the Petty's Island Refinery of the Crew Levick Co. Includes Many Features

By A. P. Frame
Superintendent, Petty's Island Refinery, Crew Levick Co.

There has recently been placed in operation at the Petty's Island refinery of Crew Levick Co. a gasoline absorption and stabilizing plant to recover the lighter gasoline fractions from the refinery and cracking plant gas. A preliminary survey, before the plant was designed, indicated that the maximum gas to be handled would be at the rate of approximately 170,000 feet per hour, although the average rate would be only about half of this.

A fractional analysis of both the gas and the gasoline at the refinery showed that, provided the gasoline was propane free, it would be desirable to recover practically all the butane from the gas and blend it with the shipments, at least during the winter months. On this basis the plant was designed to supply an oil circulation rate which would recover 90 per cent of the available butane from a gas flow of 170,000 feet per hour. To recover more than 90 per cent of the butane would require a decided increase in the oil circulation rate and the additional recovery would not justify the added expense.

To take care of possible future expansion the absorber and stills were designed to handle 340,000 feet of gas per hour, while the exchangers, coolers, etc., were designed on a gas flow of 170,000 feet per hour. It will be possible to double the capacity of the plant by duplicating the exchange and cooling equipment. The unit was designed and the equipment was manufactured by Foster Wheeler Corp. to meet the specifications of the Cities Service engineers. The erection of the plant was carried out by Crew Levick Co.

In the operation of such a plant the largest single item of operating expense is the amount of steam used which will vary from 25 to 50 per cent of the total expense. The Petty's Island plant was designed to hold the steam consumption to a minimum by the following means:

Absorption Oil Cooled

To hold the oil circulation rate to a minimum. The steam consumption will vary almost directly with the oil circulation rate, and to secure any specified butane recovery from gas of a fixed quality, the oil circulation rate is dependent upon the temperature of the absorption oil, the rate of gas flow, and the molecular weight of the absorption oil. The temperature of the absorption oil entering the absorber is maintained within 5° F. of the cooling water which has an average temperature of about 60° F. To still further aid in securing a low oil temperature, the absorber is equipped with two internal water coolers, one located just below the top tray, and the other just above the bottom tray. With these coolers in operation the temperature rise of the absorption oil is about 5° F. as against 25° F. rise without the coolers. By maintaining such low temperatures of the absorption oil, it is possible at the Petty's Island plant to recover 90 per cent of the available butane from the gas with an oil-gas ratio of 45 gallons of absorption oil per 1,000 feet of gas under maximum temperature conditions.

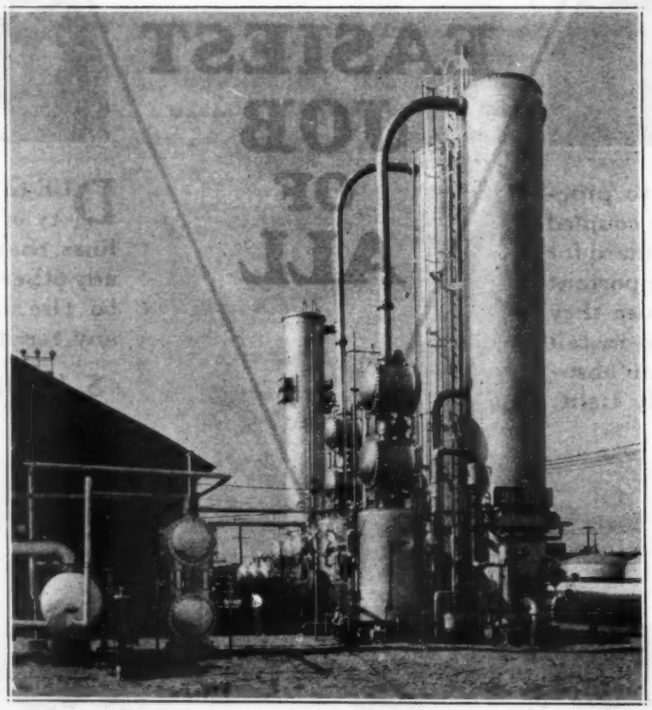
To take care of the fluctuating gas flow which occurs at a refinery, an automatic ratio controller was installed. This controller meters the incoming gas to the absorber and automatically controls a valve on the discharge from the lean oil pump so that the oil circulation rate is always 45 gallons per 1,000 feet of gas, regardless of the quantity of the gas flowing to the absorber. By this means the oil circulation is held to a minimum for the desired recovery and the operation of the stabilizer and distillation equipment decidedly improved, due to securing a uniform quality of the recovered product.

The molecular weight of the absorption oil is held low by using a paraffin base naphtha having an initial of about 400° F. and an endpoint of 525° F. This oil is produced at the refinery and makes a very satisfactory absorbing medium.

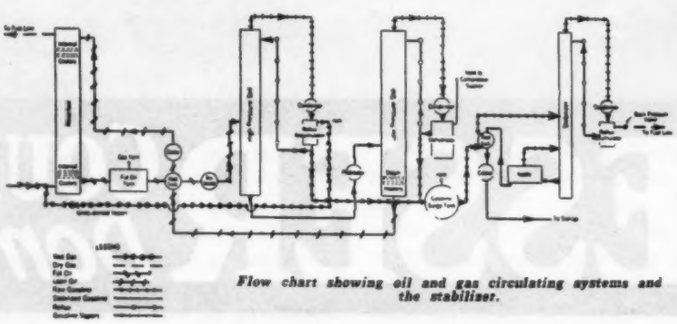
Use Two Stills

Another means of securing low steam consumption is by the using of two stills. The fat oil from the absorber contains various amounts of the recovered hydrocarbons ranging from propane and lighter to pentane and heavier. In separating these recovered hydrocarbons from the absorption oil, two more or less distinct operations must be performed. First, the recovered products must be evaporated and condensed, and, secondly, the absorption oil must be stripped of the heavier recovered products, in order that it will continue to be effective as an absorbing medium.

In order to condense the lighter recovered fractions, it is essential that the condensation and consequently the distillation should be carried out under a fairly high pressure. However, the higher the pressure in the distilling equipment, the greater the quantity of stripping steam which must be used to sparge the absorption oil. To overcome this inherent defect of single stage distillation the Petty's Island recovery plant is designed with two stills. One still operates at a pressure of 70 pounds per square inch, and here the lighter fractions are distilled and condensed. The second still operates at a pressure of 5 pounds per square inch and in this unit the heavier hydrocarbons are removed from the oil with a minimum amount of stripping steam. The amount of stripping steam is held to a minimum by using an internal heater in the base of this low-pressure still. This heater consists of a finned tube steam coil, and by means of it sufficient heat is added to the oil to compensate for the loss due to the latent heat of vaporization in flashing off the overhead products. Thus, the sensible heat of the oil is kept high enough to permit most efficient stripping by the open steam.



Absorbers and distilling equipment in the gasoline recovery plant at the Pettys Island refinery of the Crew Levick Co.



Flow chart showing oil and gas circulating systems and the stabiliser.

Efficient Heat Transfer

A third means of securing low steam consumption at the Petty's Island plant is by means of efficient heat transfer between the hot lean oil and the cold fat oil. The heat exchange equipment consists of four exchangers of the short tube cross flow type. In these exchangers the lean oil is cooled from 320° to 100° F., leaving only about 35° F. to be removed by the water coolers. On this basis about 88 per cent of the available heat in the lean oil is utilized.

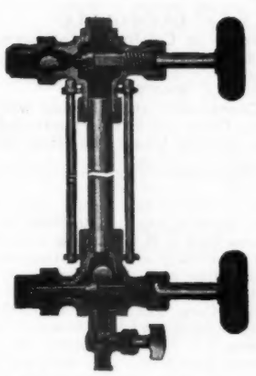
As a result of the above three methods of holding the steam consumption at this recovery plant to a minimum the steam consumption per gallon of stabilized product is about 30 pounds, which includes the steam used in the stabilizer and treating pumps.

An analysis of the product recovered from the high and low-pressure stills shows it to contain about 29 per cent liquid volume of propane and lighter. In order to be able to utilize all the butane available, it is necessary that the recovered product be propane free, because for the same vapor pressure of recovered product, the inclusion of 1 per cent of propane means roughly the exclusion of 3 per cent of butane. To secure this propane-free product the raw gasoline is stabilized in a tower operating under 180 pounds pressure. With a reflux ratio of about 7 to 1 and with a temperature of 214° F. in the reboiler, it is possible to so fractionate the raw gasoline that the finished gasolene is absolutely propane free, and with only a trace of butane in the overhead product. Such operation gives a product with a vapor pressure of about 35 pounds Reid and with excellent blending value.

From the stabilizer the gasoline flows through a continuous treating system where it is given a caustic wash to remove hydrogen sulphide, and then it is contacted with sodium hypochlorite which yields a product which is sweet, noncorrosive and entirely color stable. The amount of hypochlorite used, expressed in terms of available chlorine, is about 12 pounds of chlorine per 1,000 gallons of gasoline. This amount will seem high to those natural gasoline plant operators who are using a similar treatment, but it must be remembered that the gas from the cracking units contains relatively large amounts of unsaturated and sulphur compounds which require considerable treatment to remove. No trouble has been experienced at this plant with color instability due to chlorination products unless some of the absorption oil is allowed to carry over into the raw gasoline. If this happens there will be a tendency for the recovered product to lose several points in color on exposure to direct sunlight.

In addition to the control equipment already mentioned, the plant is equipped with automatic temperature control instruments on the two preheaters, the internal heater in the low-pressure still, the high and low-pressure top tower temperatures, and the stabilizer reboiler kettle. The feed and reflux pumps for the stabilizer are equipped with automatic volume control instruments. With such an installation of automatic control instruments the operation of this recovery plant is very uniform despite the widely fluctuating load it is called upon to handle.

The LEADERSHIP of PENBERTHY PRODUCTS



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FIRST COMPLETE MAP OF GASOLINE PIPE LINES WILL BE ISSUED JUNE 4

The first map ever published showing all gasoline pipe lines in the United States will be included in the annual pipe line number of The Oil and Gas Journal, to be issued June 4. The large wall maps showing all oil and natural gas trunk pipe lines in the country have been brought up to date, and, printed on especially heavy bond paper, will form an insert in this special issue. In addition to these large maps, detailed maps of the systems of all major oil and natural gas pipe line companies will be printed in the pipe line number.

Leading engineers and executives of pipe line companies throughout the United States have prepared articles for this special number covering the latest developments in engineering practices, design and methods employed in the construction and operation of oil, gas and gasoline pipe lines.

The reason the annual pipe line number of The Oil and Gas Journal is regarded as a veritable handbook on the transportation of oil, natural gas and gasoline is the fact the articles published in that issue are written by men recognized throughout the industry as authorities on the subjects about which they write. Leading engineers and executives of the pipe line industry who design, supervise the construction of and are responsible for equipment used and changes in methods and practices, are the men who write the articles and prepare the drawings and graphs for the annual pipe line number of The Oil and Gas Journal. It is their contribution to the industry for the vast wealth of material and new ideas they get from this issue which is of value to them throughout the year.

The superintendent of a major pipe line company, who was just completing the construction of one of the largest pipe line projects of the year, when asked to prepare an article on this line telling of the new equipment used and the reason for certain changes in design and practice stated: "I get so much valuable information from The Oil and Gas Journal, I feel it my duty to grant your request, my only hesitancy being so many of the articles on pipe lines published in some of the petroleum publications are pure bunk and misleading. I have almost decided never to write a line for publication. These articles are illustrated with drawings and pictures which give them an air of authenticity but the writers certainly don't know what they are writing about and some of the statements made are absolutely ludicrous."

This man has prepared an article for the forthcoming annual pipe line number of The Oil and Gas Journal. The industry realizes that what this man writes is the last word on this subject and that his article is well worth keeping for ready reference in the future. The same holds true for the other authors of articles for this issue. Each man preparing an article is known throughout the industry and what he writes has the stamp of authority.

In no other publication can there be found such a wealth of material of constant value to the entire pipe line industry.

High Spots in Field News

KANSAS

McPherson County Fields growing. Some wildcat showings.

ROCKY MOUNTAIN AREA

Hobbs allowable increased. Resumption on Wyoming wildcats. Deep test in Arizona.

GULF COAST

Tests in Barbers Hill, Refugio and Victoria County of special interest. Field overproducing.

WEST AND NORTH TEXAS

Grand Falls, Shipley-Bennett and Wheat Pools lead in field work. Central and Panhandle areas quiet.

OKLAHOMA

Last of potential tests in Oklahoma City responsible for big increase in output. Water intrusion increasing.

SOUTHWEST TEXAS

New pool proven in Laredo district and another on verge of being proven. Gas activity in Corpus Christi area.

NORTH LOUISIANA-ARKANSAS

New interest in Zwolle and Caddo. Wildcat developments in eastern Texas Counties. Large gasser in Rhodessa district.

CALIFORNIA

Production may increase in California following projected completions in Kettleman Hills Field. Conservation bill delayed.

EAST TEXAS

Fire out but Gregg County well still flowing wild. Three pools being extended, mainly westward. Over 120 first reports and 74 completions. Gladewater test holds interest. Upshur County has first oil well.

WAYNE-DUNDEE FIELD EXTENDED TO THE EAST

CORNING, N. Y., May 11.—The Wayne-Dundee gas field in Schuyler and Yates Counties, New York, was extended several miles when the Oriskany Drilling Co.'s wildcat, No. 1 Faucett, came in for 4,000,000 feet. The well is located 3 miles east of the village of Wayne. It is the twenty-ninth producing gas well in the Dundee Field. Gas was found at 1,951 feet and the sand was drilled in only 4 feet. The Wayne-Dundee Field is now 30 square miles in area.

It is estimated that the completed wells in the big gas area centered by Corning and lying in Tioga County, Pennsylvania, and in Yates, Schuyler and Steuben Counties, in New York, have a flush producing capacity of 210,000,000 feet a day. Preliminary work of constructing pipe lines to gas marketing centers has been in progress for some time and a number of gas lines have already been laid. It is said that the Lamoka Power Corp. is delivering 2,000,000 feet per day to Rochester and expects to extend its lines to cities farther west in the State. The Lycoming Gas Co. has finished its survey for a line to Syracuse but has not secured all the right of way and is working on that now. The Home Gas Co. is running a line to Binghamton and plans to extend it to New Jersey towns.

The Belmont-Quadrangle Drilling Co.'s line from the Dundee to the Wayne Field is being hurried along. The Rich Construction Co. is doing the ditching at this time. It is to be only 8 miles in length but will be an important connecting link.

There are over 50 wells drilling in the field and neighboring counties in both States.

MAGNETIC STORM

Tucson observatory of the United States Coast and Geodetic Survey reports a moderate magnetic storm started at 11 p. m. (C.S.T.), May 6, and ended at 8 a. m. (C.S.T.), May 8. The telegrams read:

"Storm began sixth. Five. Moderate."

"Storm ended eighth. Fourteen."

Late Fields

EAST TEXAS

FORT WORTH, Tex., May 12.—An important linking well between the Kilgore and Joiner Pools has been completed in the T. J. Martin Survey, Rusk County, on the Sanders farm, located approximately 1½ miles south of the nearest Kilgore producer. This new extension belongs to Turner & Swift. The initial production was reported as 350 bbls. in 30 minutes through tubing.

KANSAS

Phillips Petroleum Co.'s No. 2 Grattan, SE cor., Section 19-19-1w, McPherson County, Kansas, is a new location offsetting the United Petroleum Corp.'s No. 1 Smith, NW cor., Section 29-19-1w, which was recently completed for 1,900 bbls. a day, from the Viola lime pay.

Mid-Kansas Oil & Gas Co.'s No. 1 Whitright, SW cor., Section 30-19-1w, is still fishing for tools lost after the well caught fire. It was completed as a gas well from the chat at a total depth of 2,931 feet.

Reserve Oil Co.'s No. 1 Ritz, SE cor. SW, Section 31-19-1w, in a four-hour swabbing test made 300 bbls. of oil from the Viola lime pay. It was one of the best producers completed in the field during the week.

Graham Brothers' No. 1 Rolander, SE cor. SW SW, Section 30-18-2w, an old well in the Anderson Pool, McPherson County, was drilling deeper at 3,100 feet. The well was producing from the Kansas City lime at a total depth of 2,395 feet.

Phillips Petroleum Co.'s No. 1 Wiels, SE cor. NE, Section 25-19-2w, was cleaning out in Viola lime at a total depth of 3,390 feet. The test is a half mile west of the discovery Viola lime well in the Ritz-Canton area.

McPherson Oil & Gas Co. and Shell Petroleum Corp.'s No. 1 Goering, SW cor. NE, Section 1-23-4w, in Haury Pool, in Reno County, has been shut in after making 3,000,000 feet of gas and a small amount of oil from chat at 3,270-3,362 feet.

Gilmore Oil Co.'s No. 1 Sturm, NW cor. SW, Section 31-17-9w, a wildcat in southern Ellsworth County, found a hole full of water in the Silicious lime at 3,280-95 feet. The test had a showing of oil in the top of the Silicious lime at 3,243 feet. It is located about 2 miles southeast of the Shell Petroleum Corp. and others' No. 1 Ploog, in Section 33-18-9w, the discovery well in the area.

G. Dickey and the Shell Petroleum Corp.'s No. 1 Becker, SE cor., Section 35-19-2w, a southwest extension to the Ritz-Canton area, is estimated to be a 4,000-bbl. well from the chat pay. The first oil was found in the chat at 2,935-50 feet where it was estimated at 50 bbls. a day, and after drilling deeper to 2,968 feet it increased its production.

Muth Brothers' No. 1 Freeman, SE cor., Section 4-21-6w, Rice County, swabbed 175 bbls. of oil and 75 bbls. of water from the chat at 3,455-60 feet. The well is a half mile extension to the Welch Pool. The top of the chat was found at 3,430 feet.

OKLAHOMA

Magnolia Petroleum Co.'s No. 2 Telford, NW cor. SW SE Section 7-14-4, in the West Chandler Field, in Lincoln County, flowed 172 bbls. of oil in two hours from the Simpson sand at 4,970-84 feet. Same company's No. 1 Wagoner, NW cor. NE Section 18-14-4, flowed 648 bbls. of oil the first 24 hours from the Simpson sand at 4,958-68 feet.

Three wells were being completed in the Oklahoma City Field, Indian Territory Illuminating Oil Co.'s No. 2 Terrace Lawn, NE cor. NW NE Section 10-11-3w, in the west part of the field, was turned into the storage tanks making 1,104 bbls. in one hour and started to cut the connections and was shut in. It was estimated at 20,000 bbls. a day, with approximately 45,000,000 feet of gas a day. The oil was found in the Wilcox sand at 6,305-6,415 feet.

Champlin Refining Co. and Hall & Briscoe's No. 1 in Block 7, SW cor. SE SE Section 3-11-3w, was bailed in and immediately shut in when the sand cut the connections. It was estimated to be making 75,000,000 feet of gas and considerable oil from the Wilcox sand at 6,242-6,450 feet.

Tom Slick Oil Co.'s No. 2 Central, SE cor. Section 3-11-3w, made 2,987 bbls. in three hours from sand at 6,225-6,365 feet. It was drilled to the top of the sand some time ago, when it was learned the hole was crooked. It was plugged back and a new hole drilled. The gas was estimated at 20,000,000 feet a day.

The oil production from the Oklahoma City Field for May 11 and 12 was as follows: May 11, 126,427 bbls. from 102 wells; May 12, 201,296 bbls. from 111 wells, with a total of 765 completed in the field.

PETROLIA REFINERY EXTENSION

CHATHAM, Ontario, May 9.—Canadian Oil Refineries, Ltd., is preparing to construct a new wax still with condensers, storage tanks and other equipment at its Petrolia, Ontario, refinery. The cost is estimated between $10,000 and $15,000, and refinery employes will handle the construction. C. A. Hale, refinery superintendent, is inspecting United States plants with a view to selecting the type of still to install.

SCORE SHEET ON OIL PRODUCTION

Below is shown the allotted average daily production in the United States from April 1 to October 1, 1931, suggested by the Oil States Advisory Committee, and the actual daily average production in the week ending May 9:

	Allotted (bbls.)	Actual (bbls.)	Over (bbls.)	Under (bbls.)
Oklahoma	550,000	607,201	57,201	.....
Texas	714,000	890,206	176,206	.....
California	500,000	535,000	35,000	.....
Kansas	110,000	108,305	.....	1,695
Arkansas	50,000	46,955	.....	3,045
Louisiana	65,000	69,573	4,573	.....
New Mexico	40,000	41,385	1,385	.....
Rocky Mountain area	60,000	50,914	.....	9,086
Eastern States	110,000	111,500	1,500	.....
Total	2,199,000	2,461,039	275,865	13,826

Total net average daily overproduction 262,039 bbls.

Consider crude oil:

You can skim 30 or 40 per cent of gasoline from it But what can you do with the gasoline?

It's hard to sell because it knocks And you can't sell fuel oil

Now consider fuel oil:

You can Dubbs crack it and get 55 to 70 per cent of gasoline that you *can* sell

The refiner who makes the best quality product from the cheapest raw material at lowest cost is the one who profits

Universal Oil Products Co
Chicago, Illinois

Dubbs Cracking Process
Owner and Licensor

Oklahoma Production Up 57,000 Bbls.

Last of Potential Tests in Oklahoma City Responsible for Big Increase in Output. Water Intrusion Increasing

By W. A. Spinney
Staff Correspondent, Oklahoma Fields

Oil production from Oklahoma shows a substantial increase for the week ending May 9, with a daily average of approximately 607,400 bbls., which is a new peak for the year, and an increase of 57,000 bbls. a day over the previous week. The increase is entirely from the Oklahoma City area, which is producing considerably over its allowable of 175,000 bbls. a day. It is believed it was due to operators in the capital city field producing their full allowable the first two weeks in the month, and consenting to shut in their wells the last half.

The previous highest gauge for the State during the year was 585,100 bbls. a day for the week ending April 18.

The Oklahoma Corporation Commission, after hearing the evidence presented by the Blackwell Oil & Gas Co. and Jones Brothers Drilling Co. on a petition to enforce ratable taking of gas from wells in the Oklahoma City Field, is expected to make a decision shortly after May 20. That was the date set by the commission, allowing the attorneys to file briefs in the case, after which a decision will be made.

In the meantime the Blackwell Oil & Gas Co. and others have withdrawn their petition to have their No. 1 Garr-Scruggs, SE cor. NE SE Section 35-12-3w, classed as an oil well. The well is making considerable gas and oil, and it is because of this that the company is attempting to force ratable taking of gas from it. Phillips Petroleum Co.'s No. 1 Traders Compress, SW cor. Section 36-12-3w, the nearest gas producer to the Blackwell Oil & Gas Co. well, is permitted to produce gas when the company needs gas, and Blackwell Oil & Gas Co. contends in its petition that ratable taking likewise should be made from its No. 1 Garr-Scruggs.

If a decision is made in favor of the petitioners it is believed by the majority of other producers that it will apply to all wells in the Oklahoma City Field which are making a high gas volume and possibly force ratable taking of gas, as now practiced under the proration orders for crude oil.

Over and Short

On May 1 there was 1,700,000 bbls. of underproduced and underrun crude oil in the Oklahoma City Field. Otto Bradford, the field umpire, estimates that at the present rate of pipe line shipments it will require about 30 days to bring the underproduced wells up to their allowable.

The allowable production for the Oklahoma City Field, fixed by the Oklahoma Corporation Commission, for the month of May will be 6 per cent of the working potential of 2,364,784 bbls., or a daily allowable of 141,887 bbls. The commission has fixed a maximum of 175,000 bbls. a day for the field. The difference, 33,113 bbls., will be made up from the underrun oil.

The production in the Oklahoma City Field for the week ending May 9, averaged 222,154 bbls. a day and the pipe line shipments averaged 185,106 bbls. a day for the same seven days.

During the month of April the overproduction of wells in the Oklahoma City Field was 1,163,636 bbls., according to the monthly summary completed during the week by Otto Bradford, the field umpire. Oil stocks in the field of the same date totaled 1,030,136 bbls. of oil. The underproduction was 978,565 bbls. Included in the overproduction in the four and eight-hour gauges of wells which have not completed their 65-day shutdown time under the proration plan.

At the present rate of pipe line shipments the underproduction is expected to be cleared by the end of the month. The tentative allowable for the month of May has been fixed at 4,778,992 bbls. The actual production for the month of April was 4,964,063 bbls., a daily average of 165,468 bbls. for the month.

Water Increasing

The water intrusion is increasing in the Oklahoma City Field, some of Wilcox sand wells were cutting, all of the lime wells were showing water except those that have been plugged back. A survey of the field on May 2 shows 699 wells were producing naturally, 30 taking the 65 days shut-down time, 22 were on the air-gas lift, 6 swabbing, 3 pumping and 2 dead. The dead wells were Skelly Oil Co.'s No. 7 Hoopes, SE cor. NE NE, Section 31-11-2w, and Sinclair Oil & Gas Co.'s No. 3 Vencl, NE cor. SE, Section 31-11-2w.

One of the older wells, Indian Territory Illuminating Oil Co.'s No. 1 Fortson-Farley, NW cor. NE NE, Section 24-11-3w, a mile north of the discovery well, and an old producer in the Arbuckle lime, at a total depth of 6,497 feet, was plugged back to 5,950-80 feet and shot with 80 quarts, and is being completed for 8,000,000 feet of gas.

On the west edge of the field the Capitol Producing & Refining Co.'s No. 1 Refinery, SE cor. NE SE, Section 4-11 3w, the most northwesterly test in the field and near the industrial section of the city, has cemented the 8-inch casing at 5,392 feet.

Another interesting test on the north edge of the field, is Indian Territory Illuminating Oil Co.'s No. 6 M-K-T, NW cor. SW SW, Section 35-12-3w, has cemented the 7-inch casing at 6,269 feet, with the total depth being 6,300 feet.

Two new locations were announced in the north end of the field during the week by the Phillips Petroleum Co.'s No. 1 Clift, located in Block 3, Walnut Grove Addition, in the NW cor. NE, Section 3-11-3w. No. 2 Mosey is located in Block 3 of the Aungust Addition, in the SE cor. NE NW, Section 3-11-3w.

Tom Slick Oil Co.'s No. 1 Egbert, SE cor., Section 34-12-3w, in the north end of the field, flowed 8,064 bbls. of oil in four hours from the Wilcox sand at 6,225-6,455 feet. The gas was estimated at 47,500,000 feet a day.

Anderson-Prichard Oil Corp.'s No. 1 Wilson-Carpenter, SW cor. NW NE, Section 2-11-3w, is being reconditioned. It was completed about six months ago and sanded up before it was tested for production. The total depth of test is 6,493 feet in Wilcox sand.

Lease Cancellations

Oklahoma oil companies continue reducing rentals and lease holdings in the western part of the State. The work of adjusting the reduction in the acreage was started last fall. It is estimated that a total of approximately 500,000 acres of western Oklahoma leases have been canceled during the last few months.

During the first part of April a survey indicates that approximately 275,000 acres of leases were canceled and returned to the landowners in the western part of the State. During the month of March approximately 85,000 to 100,000 acres were released; while during the months of February and January approximately 100,000 acres were dropped.

Rentals have also been reduced on a large scale and it is estimated that more than 1,000,000 acres have been included in the program. The average price of rentals was $1 per acre, but it is now 50 cents an acre, with some as low as 25 cents. In some cases rentals were reduced for one year only, but in general the price is reduced for the duration of the contract, which in most cases is from five to nine years.

Only in a few instances were blocks or leases dropped on account of drilling dry holes in the area, as only a few tests have been attempted. The blocks and acreage which have been geologized and structures found are being retained.

The counties in the north central part of the State are feeling the reductions. During the month of April approximately 76,500 acres were surrendered in Payne County and lease rentals reduced on 1,000 acres. Grant County lost approximately 13,000 acres, including a large block, while rentals were reduced on thousands of acres. In Noble County approximately 2,500 acres were dropped, with rentals reduced on about the same number of acres. Blaine County, where a number of large blocks are under lease, lost approximately 4,000 acres with rentals reduced on approximately 6,000 acres. Woods County releases total approximately 3,500 acres and Woodward County approximately 2,200 acres. Rental reductions have been general throughout both counties. In Major County rentals were reduced on approximately 12,000 acres.

Oklahoma County, where one of the largest flush fields in the State was found, has been least affected. Little acreage has been released except in the Nicoma Park district, in Mid-Kansas Oil & Gas Co.'s block, where the company drilled three dry holes. Considerable acreage was dropped in the southern counties of the State as the result of dry holes. Counties most affected were Carter, Stephens, Marshall, Cotton and Comanche.

Greater Seminole Wildcats

Magnolia Petroleum Co.'s No. 1 Harris, NW cor. SW, Section 6-6-4, in southern Pottawatomie County, had a showing of oil and considerable water in the Wilcox sand at 4,455-63 feet. The water rose 250 feet in the hole. The test was a wildcat located about 2 miles north of the Asher Pool. Chances for a new producing area in the county were disappointing after cores were taken of the sands which previously were considered to be favorable to securing oil production. The test may be abandoned.

Droppleman and others' No. 1 Jones, SE cor. NW, Section 21-8-3, a wildcat in the central part of Pottawatomie County, will be operated by the Amerada Petroleum Corp. It will be tested in the Hunton lime formation at 4,645-4,775 feet. Cores taken of the Hunton indicate a showing of oil.

In Lincoln County

In the West Chandler Field in Lincoln County, Magnolia Petroleum Co.'s No. 1 Waggoner, NW cor. NE, Section 18-14-4, flowed 220 bbls. of oil in 10 hours from the Simpson sand at 4,958-64 feet. The test offsets Slick, Stanolind Oil & Gas Co. and others' No. 2 Kentzelman, SW cor. SW, Section 7-14-4, which flowed 310 bbls. in 10 hours on the last gauge and has been shut in.

Coline Oil Co.'s No. 2 Telford, SW

WILDCAT OPERATIONS IN OKLAHOMA

(Descriptions are East and North unless marked otherwise)

NORTHERN OKLAHOMA

ALFALFA COUNTY

Company, farm and location—	Remarks:
Smith Brothers' No. 1 Forbes, SE cor. NW NW Sec. 12-27-11w	Shut down 1,232 ft.
J. W. Bailey's No. 1 Acre, SW cor. NE Sec. 14-24-11w	Show oil 5,418-30 ft.; fishing

BECKHAM COUNTY

Price-McFann's No. 1 Webster, C SW SW Sec. 34-8-26w	Shut down 2,275 ft.
Mid-Continent's No. 1 Schaff, C NE SW Sec. 22-11-23w	Waiting on cement to set 430 ft.
Mid-Texas Co.'s No. 1 Sidell, NE cor. SW SW Sec. 17-2-22w	Shut down 2,550 ft.
White et al's No. 1 Green, SW cor. Sec. 34-10-24w	Shut down 3,575 ft.

BLAINE COUNTY

Washoma Oil Co. et al's No. 1 Phillips, C NW SW Sec. 13-19-10w	Shut down 4,665 ft.

CADDO COUNTY

Abernathy & Brown's No. 2 Houston, Sec. 24-6-13w	Shut down 1,115 ft.

COAL COUNTY

McGraw Oil Co.'s No. 1 Ward, NE SE Sec. 35-1-8	Shut down 1,040 ft.
Whitney et al's No. 1 Miller, SE NE Sec. 10-2-8	Shut down 760 ft.

COMANCHE COUNTY

G. W. Stogner's No. 1 Doebel, C SW SW Sec. 3-3-9w	Shut down 1,450 ft.
J. R. Travis' No. 1 Pickett, NE cor. Sec. 3-1-11w	Shut down 800 ft.

GARFIELD COUNTY

E. L. Love et al's No. 1 White, SE cor. NW Sec. 9-24-6w	Shut down 5,850 ft.

GRADY COUNTY

J. V. Bailey's No. 1 Hubbard, C NE NW Sec. 1-10-6w	Shut down 100 ft.; abnd.

GARVIN COUNTY

Malarnee et al's No. 1 Phillips, NE SW SE Sec. 24-2-2w	Drlg. 60 ft.
Skinner's No. 1 Elrod, SW cor. Sec. 13-2-3	Fishing 1,120 ft.

GREER COUNTY

French's No. 1 Murphy, SW NW Sec. 23-7-21w	Drlg. 1,600 ft.

HASKELL COUNTY

Ault et al's No. 1 Harrison, CWL SE NE Sec. 14-9-19	Shut down 650 ft.
Ault et al's No. 1 Hall, NW SW SW Sec. 14-9-19	Shut down 2,000 ft.
Ault et al's No. 1 Hall, SE NW Sec. 25-9-19	Shut down 200 ft.
Finefield's No. 1 Ogle, NW cor. Sec. 6-7-20	Fishing 600 ft.
Holden's No. 1 Phillip, SE cor. Sec. 3-9-18e	Shut down 1,860 ft.
Marion Oil's No. 1 Sanders, NW NE NW Sec. 10-9-18e	Shut down 2,387 ft.

HUGHES COUNTY

Wright et al's No. 1 Ott, SE SW Sec. 15-5-11	Shut down 1,645 ft.

KAY COUNTY

Wilwright Gas Co.'s No. 1 Wildegrube, NE SW Sec. 14-27-1	Shut down 4,055 ft.
Lewis et al's No. 1 Harris, SE NW Sec. 14-25-1	Location.
Peters & Buckles' No. 1 Hayes, NW NE NW Sec. 24-28-3	Drlg. 3,400 ft.
Mummert Drlg. Co. et al's No. 1 Cormick, C NW SE Sec. 9-27-2	Cleaning out 3,575 ft.
Blackwell Oil Co.'s No. 1 Harshman, Sec. 2-26-1w	Rig on ground.
Boucher Oil Co.'s No. 1 Jefferson, NE SW Sec. 32-26-1w	Drlg. 4,565 ft.

KIOWA COUNTY

Christian's No. 1 Jones, NE SE Sec. 8-7-18w	Drlg. 220 ft.

LATIMER COUNTY

Choctaw Gas' No. 1 Weaver, C NE NW Sec. 4-6-18	Shut down 3,475 ft.
P. English's No. 1 Unknown, NW SE Sec. 16-6-19	Shut down 1,542 ft.

LINCOLN COUNTY

Mote-Wheeler's No. 1 Stafford, NW NE Sec. 32-17-4	Drlg. 4,455 ft.

(Continued on Page 118)

cor. NW SE, Section 7-14-4, flowed 3,913 bbls. of oil in 24 hours from the Simpson sand at 4,982-87 feet.

Deep Test in Caddo County

The Mid-Kansas Oil & Gas Co. and Ramsey Petroleum Corp.'s No. 6 Preston-Culp, NW cor. NE NE, Section 6-5-9w, on the west side of the Cement Pool, in Caddo County, was drilling in black shale at 7,095 feet, with nothing showing. The last showing of oil and gas was found at 6,770-73 feet.

Magnolia Petroleum Co.'s No. 2 Estes, SE cor. SW NE, Section 10-5-9w, in the Cement Pool, was drilling in blue shale at 3,907 feet.

Holmes and others' No. 1 Flannagan, NW cor., Section 2-8s-1, Love County, the most southern test in the State, was cementing surface pipe at 40 feet, and is shut down.

Oil Showing in Haskell County

The wildcat test, Indian Territory Illuminating Oil Co.'s No. 1 Holleman, C SW NE, Section 23-11-21, Haskell County, found a showing of oil in sandy lime at 1,762-67 feet and is now shut down at 2,022 feet in shale with no increase in the oil showing. It is believed to be the first showing of oil found in the county, which has considerable gas production.

The wildcat test of J. W. Bailey and Western Royalty & Producers Co., No. 1 Acre, SW cor. NE, Section 14-24-11w, Alfalfa County, is expected to resume operations. The test now has a fishing job at 5,430 feet, where a showing of oil was found from 5,418-30 feet. H. M. Harris was recently appointed receiver of the property and when the fishing job is completed he expects to drill the test to the contract depth of 5,500 feet, where bottom hole contracts were made with several offset leaseowners.

Producing from the 1,925 producing wells in the Burbank Field in Osage County, averages less than 6 bbls. per day per well. The oil usually commands a premium because of its high lubricating oil content. The daily production from the wells averaged 11,325 bbls. a day for the week ending May 9. Phillips Petroleum Co. leads with 2,542 from 325 wells, not including its partnership leases of Skelly Oil Co. and Phillips Petroleum Co. Carter Oil Co. has 1,552 bbls. from 284 wells, and the Vacuum Oil Co. has 1,244 bbls. of oil a day from 234 wells.

In Southern Fields

In the southern part of the State two tests in the Tatums Field in Carter County were being completed. Lesh & McCall's No. 2 Carter, NE cor. SW SW, Section 14-1s-3w, is estimated to be a 125-bbl. well when put to pumping. The oil was found in sand at 2,553-75 feet and the total depth is 2,582 feet. No swabbing gauge was made at the well. It flowed approximately 100 bbls. of oil in two hours while the operators were landing the tubing. Amos Drilling Co.'s No. 1 Sparks-Hooks, SE cor., Section 13-1s-3w, on the northeast edge of the field, was shut down waiting for cement at 1,945 feet. It found a showing of oil in sands at 1,946-2,106 feet and the total depth is 2,110 feet.

An old producer in Stephens County was drilled deeper and was showing oil. Lee Morrison and others' No. 2 Hightower, SW cor. NE, Section 15-3s-5w, was drilled deeper to 1,138 feet, where the operators were preparing to abandon the test when the oil rose 500 feet in the hole. It will be put to pumping.

Crane & Rankin's No. 1 Adkins, NE cor. SE, Section 14-1-9w, Stephens County, was still shut down at a total depth of 3,265 feet. It is a wildcat north of production in the Oil City Field.

Other wildcats in the area were also shut down. P. Turner and others' No. 1 Andrews, NW cor. SW SW, Section 5-2s-7w, was inactive at a total depth of 1,827 feet. R. Southard and others' No. 1 McKinney, NE cor., Section 25-1-8w, was shut down at 1,062 feet.

The Ute Oil Co.'s No. 1 Williams, C SW, Section 23-12-24w, Roger Mills County, in the southwestern part of the State, was drilling at 4,825 feet in a 10-inch hole. The test is drilling in the Pennsylvanian series.

Oklahoma City Wells

Latest tabulations on tested wells in the Oklahoma City Field for January and April potentials, include the following:

Well and number—	April	Jan.
Indian Territory Illuminating Oil Co.		
No. 1 Mae Knox	15,357	6,360
No. 3 Bodine-Anderson	220	377
No. 5 Pasadena Hts.	840	none
No. 2 View Point	39,864	none
No. 1 A. Precure	6,675	19,278
No. 3 M. Fuzzell	1,466	2,200
No. 6 Johnson	7,136	5,250
Oklahoma City Petroleum		
No. 1 Lively	38,532	none
Shell Petroleum Corp.		
No. 2 Petty	102	78
No. 3 Petty	2,326	2,295
Anderson-Prichard Oil		
No. 1 Sandness	38,744	none
No. 1 Clark	25,818	none
No. 1 Westfall	36,718	none
Coline Oil Corp.		
No. 1 Warren	253	none
Phillips Petroleum		
No. 1 Davis	58,461	none

Greater Seminole Production

The production from the Greater Seminole area for the week ending May 9 was 183,526 bbls. of oil a day from 2,855 wells. The first 12 pools listed below comprise the Seminole area, which averaged 129,204 bbls. of oil a day from 1,852 wells.

Pool—	Bbls.
Little River	25,475
E. Little River	5,882
Carr City	11,394
Maud	2,350
Mission	7,415
Bowlegs	14,500
Earlsboro	18,995
S. Earlsboro	6,380
E. Earlsboro	15,600
Seminole	13,366
E. Seminole	1,383
Searight	4,210
Total	126,850
Allen	11,775
Asher	690
Wanette	7,370
Konawa	5,365
Sasakwa	2,510
St. Louis	20,810
Grand total	178,482

Oklahoma City Shipments

The total shipments from the Oklahoma City Field for the week ending May 9 were 1,295,742 bbls. of oil. The shipments by companies are as follows:

Company—	Bbls.
Empire	221,373
Magnolia	8,557
Oklahoma	115,353
Operators	32,578
Prairie	9,678
Shell	76,611
Sinclair	402,696
Stanolind	356,104
I.T.I.O.	17,375
Tidal	8,247
Anderson-Prichard	5,513
Century	15,811
Crude oil	7,998
Petroleum P. L.	3,533
Champlin	14,315
Total	1,295,742

Creek County

Hoover Brothers' No. 1 Briggs, NW cor. NE NW, Section 36-19-8, is rigging up. O'Hair & Foster's No. 1 Stanley, SW cor. NW, Section 4-17-10, is dry and abandoned at 3,143 feet in Wilcox sand. Pioneer Petroleum Co.'s No. 15 Bucktrot, SE cor. NE, Section 24-17-10, has been completed for 50,000 feet of gas in sand 1,548-60 feet, total depth 1,886 feet.

Comanche County

Max Pray Oil Co.'s No. 1-A Kline, NE cor., Section 8-3-10w, has been abandoned at 894 feet.

Hughes County

Roettcher Oil & Gas Co.'s No. 1 Walker, C NW SW, Section 11-7-8, made 35,000,000 feet of gas in sand 2,911-27 feet.

Jefferson County

Monarch Petroleum Co. has the rig up for No. 1 Briggs, SW cor., Section 36-3s-4w.

Lincoln County

Coline Oil Co.'s No. 2 Tillford, SW cor. NW NE, Section 7-14-4, West Chandler Pool, made 3,913 bbls. in Wilcox sand 4,982-87 feet.

McIntosh County

J. S. Routt and others moved a machine in for No. 2 J. Fife, C NW SE, Section 10-11-15. No. 1 M. Wolf, CSL NE SE, Section 34-12-15, is dry and abandoned at 1,240 feet.

Muskogee County

Mack Drilling Co.'s No. 6 D. Richards, NE cor. SE NE, Section 33-16-15, is a machine. Hall & Ray's No. 1 A. Scott, SE cor. NW SW, Section 30-12-19, is dry and abandoned at 1,002 feet.

Okmulgee County

Denton & Marshall's No. 1-A Delano, NE cor. NW SE, Section 5-14-14, is spudding. Mack Drilling Co.'s No. 1-A McKay, SW cor. SE SE, Section 24-16-14, has been abandoned at 2,050 feet.

Oklahoma County

Phillips Petroleum Co. has the cellar dug for No. 1 Clift, NW cor. NE, Section 3-11-3w, Oklahoma City Pool. Location has been made for No. 2 Mosey, Block 3, Lot 27, August Addition, NE cor. SE NE NW, Section 3-11-3w. Indian Territory Illuminating Oil Co.'s No. 3 Ivanhoe, Block 5, Lot 19, Ivanhoe Addition, NW cor. SE NE, Section 15-11-3w, is a cellar. Westgate Oil Co.'s No. 1 Carey, SE cor. NE SE, Section 34-12-3w, has been completed for 8,662 bbls. in 4¼ hours in Wilcox sand 6,261-6,405 feet, total depth 6,410 feet. T. B. Slick estate's No. 1 Egbert, SW cor. SE SE SE, Section 34-12-3w, made 8,064 bbls. in four hours from Wilcox sand topped at 6,225 feet, total depth 6,455 feet. Champlin Oil & Refining Co. and Hall & Briscoe's No. 1, Block 19, NE cor. SW SW SE, Section 3-11-3w, flowed 5,649 bbls. in four hours from Wilcox sand 6,301-6,445 feet, total depth 6,460 feet. Phillips Petroleum Co.'s No. 1 Davis, CEL NE SE NW, Section 10-11-3w, made 9,783 bbls. in four hours from Wilcox sand 6,317 feet, total depth 6,490 feet.

Okfuskee County

Keaton, Gold and Stanolind Oil & Gas Co. made location for No. 1 L. Harjo, SE cor. SW, Section 7-12-11. A. Moffitt and others' No. 4 Summers, SW cor. NW NW, Section 8-11-12, is dry and abandoned at 1,420 feet.

Pittsburg County

National Royalties Co. moved a machine in for No. 1 Ross, NW cor. SW, Section 17-7-18.

Seminole County

Tigher Oil & Gas Co. and others made location for No. 1 Charley, SW cor. NW SE, Section 18-8-6. Pierce and others' No. 1 Phillips, SW cor. SE, Section 8-9-6, has been completed for 295 bbls. in Wilcox sand 4,215-45 feet. Burke-Greis Oil Co.'s No. 3 Henshaw, NW cor. NE SW, Section 30-8-8, Wewoka Townsite Pool, drilled to 4,132 feet in Wilcox sand, plugged back to 3,880 feet and made 1,450 bbls. from Hunton lime 3,764-3,955 feet.

Tulsa County

West Petroleum Co.'s No. 10 V. Edwards, NE cor. SW SW, Section 1-18-12, is drilling deeper from 2,064 feet. Tulsa Drilling Co.'s No. 1 E. Harrison, SW cor. NW SW, Section 14-18-17, is rigging up.

TEXANS FEATURE DALLAS MEETING A.P.I. DIVISION OF PRODUCTION

DALLAS, Tex., May 11.—The first midyear meeting of the American Petroleum Institute's Division of Production, to be held June 2 to 4 in the Baker Hotel at Dallas, will attract hundreds of native sons who have made their name in the petroleum industry in Texas and other states.

Governor R. S. Sterling, of Texas, tentatively has accepted an invitation to speak. R. R. Penn, Penn Oil Co., Dallas, Institute vice president for production, will preside. A number of Texans will present papers on various technical subjects.

The directorate of the Institute is 15 per cent Texan. Of the 69 leaders of the industry who are members of the board of directors, 10 are Texans. They are:

E. R. Brown, Magnolia Petroleum Co., Dallas; W. S. Farish, Humble Oil & Refining Co., Houston; Roy B. Jones, Panhandle Producing & Refining Co., Wichita Falls; J. F. Lucey, Lucey Petroleum Co., Dallas; E. J. Marston, Texas Pacific Coal & Oil Co., Fort Worth; E. T. Moore, Simms Oil Co., Dallas; Henry C. Morris, Lone Star Gas Co., Dallas; J. Edgar Pew, Sun Oil Co., Dallas; Wallace E. Pratt, American Association of Petroleum Geologists, Houston, and Vice President Penn.

On Tuesday, June 2, at 9:30 a.m., the board of directors will assemble at the Texas & Pacific Railroad station at Longview and a half hour later will start upon an automobile tour of the new East Texas oil fields. The board will take luncheon at an oil company camp and proceed to the Van Field to study its development on the unitization plan. It is expected dinner will be served at Van and the board will return to Dallas by motor in the evening.

The directors will attend sessions of the midyear meeting at Dallas on June 2 and 4, and on Friday, June 5, will hold a board meeting in the Texas Hotel at Fort Worth.

Another Texan, important in the conduct of the Institute's many and varied affairs, is William R. Boyd, Jr., executive vice president and active managing official at general headquarters in New York, N. Y. Mr. Boyd is a native of Fairfield, Freestone County, and was an attorney-at-law at, as well as the first mayor of, the city of Teague. He also was president of a bank at Eddy and, prior to removal East, member of the investment banking firm of Philp, Boyd & Co., and resident of Dallas. He is the son of District Judge W. R. Boyd, of Teague.

Mr. Penn not only is vice president for production but is also chairman of the General Committee of the Division of Production. The office of this division of the Institute is in the Kirby Building, Dallas. Carl A. Young is the secretary of the division and actively in charge.

Committee Sessions

Sessions of many standing committees of the Division of Production will be held during the meeting. Among Texans who are chairmen of such committees are: W. W. Fondren, Humble Oil & Refining Co., Houston, Committee on Standardization of Standard Rigs and Derricks; John R. Suman, Humble Oil & Refining Co., Houston, Committee on Standardization of Specifications for Steel and Iron Pipe for Oil Country Tubular Goods; H. W. Fletcher, Hughes Tool Co., Houston, Correlating Committee on Gauges and Gauging Practice; W. W. Scott, Humble Oil & Refining Co., Houston, Committee on Production Practice; W. S. Farish, Humble Oil & Refining Co., Houston, Central Committee on Standardization Procedure for Measuring, Sampling and Testing Crude Oil; W. R. Trelford, Humble Oil & Refining Co., Houston, Group 5 Subcommittee on Marine Transportation; and R. W. Pack, Sun Oil Co., Beaumont, Committee on Fire Prevention in Oil Fields.

Among Texans who are chairmen of district or subcommittees are: W. V. Bowles, The Texas Company, Houston; W. D. Brookover, Panhandle Refining Co., Wichita Falls; J. H. Tucker, Gulf Production Co., Houston; W. H. Meier, Atlantic Oil Producing Co., Dallas; W. C. Thomas, Vacuum Oil Co., Houston. H. M. Staggs, Atlantic Oil Producing Co., Dallas; J. H. Russell, Gulf Production Co., Houston; H. M. Stevenson, Humble Pipe Line Co., Houston; C. W. Alcorn, Shell Petroleum Corp., Dallas; R. H. Fash, Fort Worth Laboratories, Fort Worth; R. B. Kelly, Pure Oil Co., Fort Worth; R. A. Wilson, Dallas; H. D. Wilde, Jr., Humble Oil & Refining Co., Houston; Harold J. Vance, Dalance Oil Co., San Antonio; R. J. Daniel, Texas Pipe Line Co., Houston; E. R. Lederer, Texas Pacific Coal & Oil Co., Fort Worth; T. J. McMahon, Texas Pipe Line Co., Houston; Gay Carroll, Humble Oil

(Continued on Page 127)

McPherson County's Growing Fields

Potential of 65,000 Bbls. of Oil and 500,000,000 Feet of Gas per Day as Pools Are Extended. Wildcat Showings

By W. A. Spinney
Staff Correspondent, Kansas Fields

Production continues to increase in McPherson County, which now holds first place in oil production in Kansas, and extension wells are almost of daily occurrence. Operators are being forced to reduce the allowable flow of their wells owing to the limited pipe line outlet. The State's production shows an increase of approximately 1,000 bbls. a day for the week ending May 9, over the previous week. The daily average of the State for the same seven days was estimated at 108,350 bbls.

The Welch Pool in Rice County was again extended more than a half mile to the southwest. Muth Brothers' No. 1 Freeman, SE cor., Section 4-21-6w, in southeastern Rice County, was showing oil from the chat at 3,430-60 feet. The oil rose about 2,500 feet in the hole and the well was showing enough gas to make it necessary to shut down and move the boiler back before it was drilled deeper and given a production test. The nearest producing well is that of Rogers & Hipple's No. 1 in NE NW SE, Section 3-21-6w, which was estimated at 1,200 bbls. a day which also gave the pool another extension.

The development of gas in McPherson County has put the county in second place in gas production in the State, being surpassed by Stevens County in the Hugoton gas field in the southwestern part of the State. It is believed the proration plan now in effect in the Ritz-Canton area will be extended to the Decker gas field, which now has considerable oil production. Umpire Lloyd Pickrell is making a survey of the field. Many express the opinion the Ritz-Canton and Decker gas fields will be joined by future development. The fields are now divided by a distance of only a half mile.

Stanolind Oil & Gas Co. and others' No. 1 Martin, NE cor. SE SE, Section 3-16-3w, Saline County, was drilling at 2,750 feet in shale and is expected to reach completion depth in the near future.

H. Rosenthal, Stanolind Oil & Gas Co. and Amerada Petroleum Corp.'s No. 1 Gray, C NE, Section 11-24-13w, in northeastern Stafford County, was landing casing at 1,800 feet. The test found a showing of gas at 1,745 feet.

In the Eastborough Pool, National Refining Co.'s No. 3 Murdock, NW cor. SE SE, Section 18-27-2, has been plugged back successfully shutting off the water. It was formerly making around 500 bbls. of water and 300 bbls. of oil, and is now making around 200 bbls. of oil and a small amount of water.

G. W. Dickey and Shell Petroleum Corp.'s No. 1 Becker, SE cor., Section 35-19-2w, found oil in the chat at 2,935-46 feet. The test extends production in the southwest part of the Ritz-Canton area a quarter of a mile. Tankage was being erected before a production test is made.

Potential Increase in Ritz-Canton

With the potentials increasing in the Ritz-Canton area in McPherson County almost daily the purchasers of crude oil must increase their runs from the field or further reductions in the allowable output must be made. Field Umpire Lloyd Pickrell, estimates the potential of the area as of May 2, to be approximately 64,000 bbls. a day, while the market outlet is only 6,300 bbls. a day.

The allowable output was reduced to 12 per cent some time ago and it was again reduced to 10 per cent a few days ago with the probability that it will be further reduced during the next few weeks to 8 per cent, as many new wells are due to be completed in the field. The last potential taken April 1, was 42,000 bbls. under the unit plan from 39 wells. Notwithstanding the growing potential of the area and also in other fields in the State, which also lacks a market outlet, the entire State's daily average production has been holding at steady levels.

While the field umpire was in the field one of the recently completed wells was regauged. The well was T. Palmer and others' No. 2 Winn, SW cor. NW, Section 7-20-1w, on the south edge of the field, as a 2,770-bbl. well. The gauge is based on a 12-hour gauge from the chat formation at a total depth of 2,982 feet.

One of the few dry holes as yet completed in the Ritz-Canton Field apparently defines the field to the north. It was located a mile from the nearest production in any direction. The test was Prairie Oil & Gas Co. and Gypsy Oil Co.'s No. 1 Way, SE cor., Section 18-19-1w, it was drilled to the Silicious lime at 3,550-65 feet, where a hole full of water was found. The test also missed finding pay in the chat, Viola and Simpson formations.

The new extension well in the Voshell Pool in McPherson County, Otstot, Stanolind Oil & Gas Co. and Amerada Petroleum Corp.'s No. 1 Kaufman, NW cor. SW, Section 15-21-3w, flowed 340 bbls. of oil in 18 hours from the chat at 3,074-76 feet. The well was also making 5,000,000 feet of gas a day. It extends production a quarter of a mile in the southeast part of the pool.

Derby Oil Co.'s No. 1 Goering, in Section 1-23-4w, in the Haury Pool, Reno County, swabbed 8 bbls. of oil from the Viola and was drilling deeper at 3,530 feet to the Misener sand. If the Misener sand does not produce the test will be plugged back to the Viola and shot.

Water in Wright Pool

The Valley Center Field or Wright Pool, in Sedgwick County, is now yielding 24,000 bbls. of water a day and 8,000 bbls. of oil. The water encroachment is threatening the field and is increasing the lifting costs. Many of the older producers are being abandoned and plugged. A partial list of the wells that have been abandoned by the different companies are: Derby Oil Co., Aladdin Petroleum Co., Stearns and Streeter, Sutter and Pyle, Braden and McClure, Tidal Oil Co. and Vickers Petroleum Co.

Continental Oil Co. and Gypsy Oil Co.'s Carr and Reid leases are the best producing leases in the field at the present time. Skelly Oil Co. and others' Davis lease is only pumping six of the 12 wells, due to the water.

The Sellens area in southern Russell County averaged 540 bbls. of oil for the week ending May 9. The total production for the week was 3,780 bbls. of oil. The average production from each well in the area is approximately 67 bbls. a day.

McPherson's Gas Area

The potential gas output of the Ritz-Canton and Decker gas fields in McPherson County is estimated at 500,000,000 feet day. New wells are being completed every week and adding to the potential. United Petroleum Co. and others' No. 1 Lacquement, NE cor. NW SE Section 20-19-1w, gauged 23,500,000 feet of gas a day from the chat. The well extends the gas area a half mile to the south from the discovery gas well on the east side of the Ritz-Canton Field.

With the completion of a Viola lime well in Section 24-19-2w, the production from the deep horizon in the Ritz-Canton area is now 4½ miles long and 2 miles wide. The test was Madison, Lassen & Simmon's No. 1 Hale, SE cor. NE Section 24-19-2w.

Derby Oil Co.'s No. 2 Sandy, C SE SW Section 15-19-2w, in the Decker gas field, McPherson County, was making 20,000,000 feet of gas from the chat at 2,938-50 feet.

Two of the deep Viola lime wells were shot and both increased their production. Corn and others' No. 1 Unruh, SW cor. SE Section 31-19-1w, was shot with 12 quarts and was making 45 bbls. of oil an hour from a total depth of 3,425 feet. Jones and the Shell Petroleum Corp.'s No. 1 Peterson, NW cor. SW SW Section 7-20-1w, was shot with 5 quarts at 3,406-11 feet. The hole filled with oil and the operators were preparing to make a production test.

A Sedgwick Wildcat

Another semiwildcat test is expected to be started northeast of production in the Eastborough Pool, Sedgwick County, if a producer it will extend the producing area more than a half mile. Negotiations, now in progress, will give the SE Section 17-27-2, another test. The first test was drilled in the SW cor. SE Section 17-27-2, to a total depth of 3,305 feet, and abandoned as a dry hole. The new test will be drilled by Spencer Brothers, National Refining Co. and Lario Oil & Gas Co., in the NW cor. SE, Section 17-27-2. The nearest production to the new location is the National Refining Co. and others' Murdock lease in the E half SE, Section 18-27-2. Owners of offset acreage are co-operating in the drilling of the test.

McPherson Oil & Gas Co. and Shell Petroleum Corp.'s No. 1 Goering, SW cor. NE, Section 1-23-4w, in the Haury Pool, Reno County, was making 3,000,000 feet of gas a day and 5 bbls. of oil a day from the chat at 3,262-3,363 feet.

The wildcat test of Gilmore Oil Co. and others, No. 1 Sturm, NW cor. SW, Section 31-17-9w, Ellsworth County, has landed casing at 3,245 feet to shut off a cave and had a showing of oil at 3,242 feet. The test is located on the Ellsworth Arch and it is expected to test the pay horizon at 3,375 feet.

The wildcat test of Empire Oil & Refining Co. and Shell Petroleum Corp., No. 1 Showalter, NW cor. SE, Section 23-23-2w, Harvey County, is being abandoned at a total depth of 3,550 feet in Silicious lime.

Butler County

Empire Oil & Refining Co.'s No. 100 Koogler, SW cor. NW SE, Section 20-26-5, has been completed for 150 bbls. in sand 2,556-92 feet.

Cowley County

Roth & Faurot's No. 4 Brant, SW cor. NE, Section 12-32-4, made 240 bbls. in sand 2,548-60 feet. McKnabb & Bess' No. 2 State, SW cor. NE NW, Section 15-32-4, has been completed for 125 bbls. in sand 3,252-91 feet.

Elk County

Minnehoma Oil Co.'s No. 2 Denton, NW cor. SW SW, Section 3-31-8, an old well deepened, made 100 bbls. from sand 1,983-2,000 feet.

Geary County

Wright and others' No. 1 Youkon, NW cor. NE, Section 17-11-5, is dry and abandoned at 3,240 feet.

Greenwood County

Harwood Oil Co. and Smith's No. 1 Beal, NE cor. SE, Section 28-23-11, is a rig under construction. Haverhill Petroleum Co.'s No. 20 Inthurn, NW cor. SE, Section 4-23-13, made 45 bbls. in sand 1,615-48 feet. Sinclair Oil & Gas Co.'s No. 2 Beavers, CSL NE SW, Section 25-24-12, has been completed for 25 bbls. in sand 1,604-45 feet. Sheedy and others' No. 1-A Nixon, NE cor. SE NW, Section 5-24-13, is dry and abandoned at 2,025 feet.

Harvey County

Empire Oil & Refining Co. and Shell Petroleum Corp.'s No. 1 Seiler, NW cor.

(Continued on Page 140)

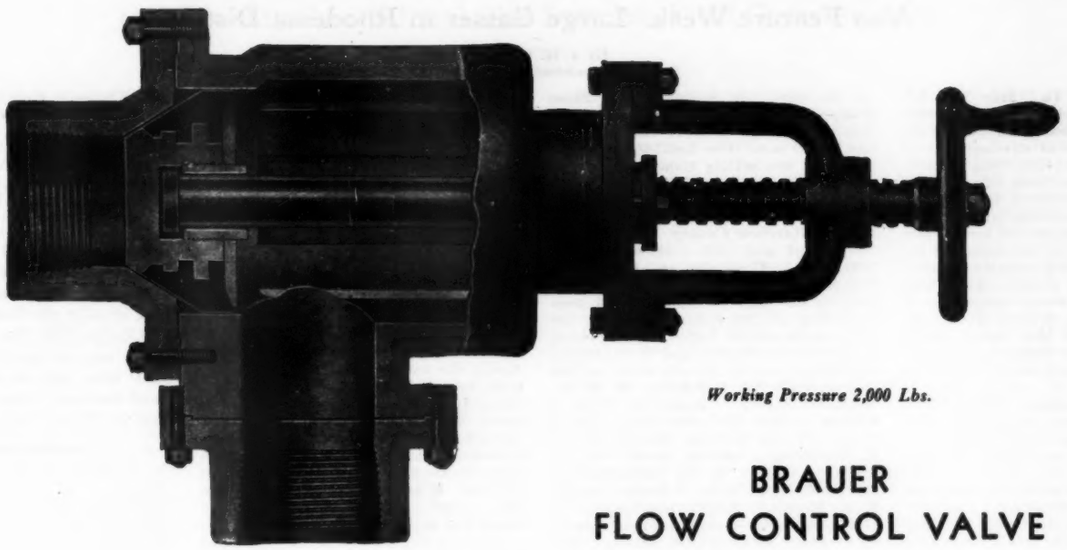
WILDCAT OPERATIONS IN KANSAS

(Descriptions are East unless marked otherwise)

Company, farm and location—	Remarks:
BARTON COUNTY	
Syndicate Oil Co.'s No. 1 Borris, NW SE SE Sec. 13-18-12w	Fishing 2,140 ft.
Skelton Oil Co.'s No. 1 Ott, C SE SE Sec. 16-19-14w	Shut down 2,065 ft.
McCool et al's No. 1 Tsern, NW SE NE Sec. 12-20-11w	Shut down 1,600 ft.
CLAY COUNTY	
Crystal Oil et al's No. 1 Tivler, SW cor. Sec. 19-8-2	Shut down 2,500 ft.
COFFEY COUNTY	
Heyburg's No. 1 Kroft, SE SW SE Sec. 30-22-14	Shut down 1,300 ft.
Roberts et al's No. 1 Hay, SW SE NW Sec. 32-22-15	Shut down 1,250 ft.
COWLEY COUNTY	
Fisher et al's No. 1 Hurt, C SW SE SE Sec. 11-34-3	Rig.
Roth & Faurot's No. 1 Reedy, SW NW NE Sec. 8-32-8	Shut down 1,040 ft.
DICKINSON COUNTY	
Severs et al's No. 1 Lavengood, NE SW Sec. 18-13-2	Shut down 3,850 ft.
ELLSWORTH COUNTY	
Gilmore Oil et al's No. 1 Sturm, NW SW Sec. 31-17-9w	Shut down 3,105 ft.
Hershey et al's No. 1 Schultz, C NE Sec. 9-14-8w	Drlg. 1,310 ft.
Alyward et al's No. 1 Stratman, SE NW SE Sec. 1-17-10w	Silicious 3,255-71 ft.; 117 bbls. 2 hrs.; shut in; est. 2,000 bbls.; no pipe line connection.
Aladdin Pet.'s No. 1 Stoddenberg, C SW Sec. 22-16-10w	Shut down 1,130 ft.
Milton et al's No. 1 Kester, SE NE Sec. 6-14-9w	Drlg. 2,170 ft.
FORD COUNTY	
Carter Oil Co.'s No. 1 Everett, C NE Sec. 22-29-21w	Drlg. 3,019 ft.
Swain et al's No. 1 Taylor, C NW Sec. 21-25-24w	Drlg. 4,790 ft.
GRAHAM COUNTY	
Schleimeyer et al's No. 1 Clark, SW NE NE Sec. 11-9-25w	Drlg. 4,150 ft.
HARPER COUNTY	
Beeler et al's No. 1 Bear, C NE Sec. 21-36-6w	Shut down 1,830 ft.
HARVEY COUNTY	
Empire-Shell's No. 1 Showalter, NW SE Sec. 23-23-2w	Drlg. 3,380 ft.
KINGMAN COUNTY	
Skelly Oil's No. 1 Miles, NE cor. Sec. 30-27-10w	1,635-40 ft. 2,000,000 ft. gas; at 2,005-20 ft. 6,000,000 ft. gas; at 2,133-42 ft. 3,000,000 ft. gas; showing oil 3,385 ft.; T. D. 3,441 ft.; S. D.; estimated at 600 bbls. a day.
LYON COUNTY	
Sheedy et al's No. 1 Brown, C W half SE Sec. 10-20-11	Spudding.
MARION COUNTY	
Midwell's No. 1 La Master, NW cor. Sec. 31-22-4	Shut down 650 ft.
McPHERSON COUNTY	
Henderson & Holden's No. 1 Sommerfield, NE NW Sec. 23-19-1w	Showing 25 bbls. of oil and 50 bbls. of water a day; drlg. 3,520 ft.

(Continued on Page 118)

BRAUER SUPERIOR PRODUCTS



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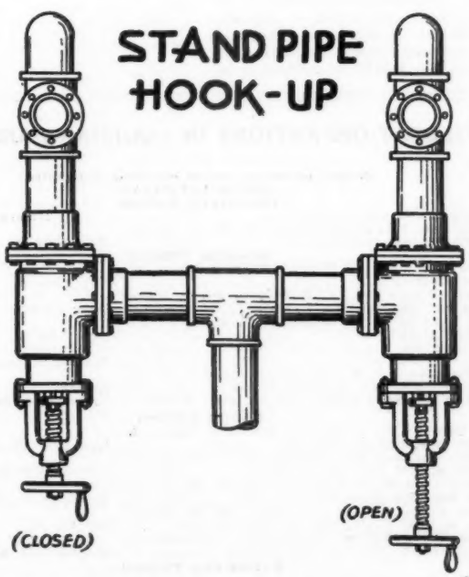

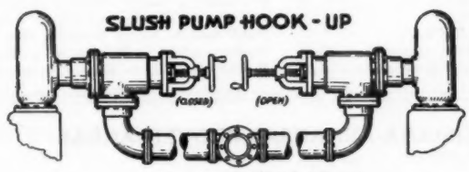

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OKLAHOMA CITY, OKLAHOMA ARP, TEXAS

Awakened Interest in Zwolle and Caddo

Wildcat Developments in Border Counties of East Texas Also Feature Week. Large Gasser in Rhodessa District

By J. R. Crumpton
Staff Correspondent, Louisiana-Arkansas

SHREVEPORT, La., May 11.—The southeast Zwolle Field; the wet gas producing area in Rhodessa, northwest Caddo Parish, and wildcat developments in two border counties of East Texas contributed this week to the rising tide of awakened interest in operations in this division. An intensive drilling campaign has been started, centering in and around Section 1-7-11, the recent extension to the Zwolle chalk rock field in Sabine Parish. Operations in this vicinity have been spurred on by the recent completion of Lyons & Neely's No. 1 Byrd, which continues to flow 1,200 bbls. daily, choked in, and which seems destined to be one of those long flowing wells, a rare exception in this field.

In the Rhodessa district, United Production Co. completed No. 1 Emmons, Section 27-23-16, making 38,516,000 feet of highly saturated gas from 5,570 feet. This is the second large gasser from the upper Trinity formation in this area during the past two weeks and the fifth successful completion for the field. The Emmons well, on the first test a week ago, was a disappointment, gauging less than 5,000,000 feet from 5,541 feet, but after deepening 29 feet the flow was increased, resulting in one of the best gassers in this field. The gas production in this area is expected to extend into Cass County, Texas, which borders the Louisiana field on the west.

Monroe and Richland gas areas had their usual gas completions, Union Parish furnishing one with the completion of Fred A. Green's No. 1 United States Government, Section 26-20-3, gauging 7,020,000 feet of gas from 2,166 feet. Richland's completions were Southern Carbon Co.'s No. 1 Rosengrant & Ducomb, Section 24-17-5, making 24,144,000 feet of gas, total depth 2,430 feet, and United Carbon Co.'s No. 1 Mann, Section 12-16-5, gauging 12,736,000 feet from a total depth of 2,450 feet.

EAST TEXAS

Tests in two border counties of East Texas had interesting developments during the week. In Shelby County, Sloan Prospecting Co.'s No. 1 Windham, A. H. English Survey, cored 17 feet of likely looking oil sand from 2,652-69 feet. The operators are setting 6-inch casing and arranging to test at this depth. Elmore & Banner have set 6⅝-inch casing on their No. 1 Lowery, W. W. O. Stanfield Survey, Harrison County, at 2,797 feet. They cored sand with a show of gas at 2,804 feet. Five rigs are running in Harrison County and six others are rigging up for tests. William H. Atkinson is drilling at 206 feet after setting 10-inch casing at 195 feet on No. 1 Hays, J. H. Chaffin Survey, and O. O. Olford and others have set 10-inch casing at 198 feet on their No. 1 Bolding, W. W. O. Stanfield Survey. George L. Pace is drilling in lime at 3,560 feet on No. 1 Barker, Victor Pedrosa Survey and O. H. Parkering is drilling at 600 feet on his No. 1 Taylor, W. H. Payne Survey. Rowan & Nichol's No. 1 Bussey estate, E. A. Merchant Survey, has spudded in after being delayed several weeks rigging up by heavy rains in that section. This test is 9 miles north and west of Hallsville, Harrison County, a short distance from the Gregg County line.

In Panola County, Everett Drilling Co. reports a strong gas pressure in No. 1 McDaniels, Alansan Barr Survey, at 1,315 feet. Gas has been reported coming from the well for several days after being choked down with mud and the operators will make a test as soon as casing can be set. The well is considered in wildcat territory, being near the Shelby County line about 12 miles south of Carthage. Moses & Wallace, who will make a 5,000-foot test of No. 1 Daniel, Isabel Hanks Survey, have derrick up and machinery installed. The Texas Company has set 6⅝-inch casing on No. 12 G. W. Brumble, John Womack Survey, at 4,450 feet, and United Production Co. is drilling at 1,485 feet in No. 1 Warner, Ben Jordon Survey, which will also be a deep test. Hoffer and others announce location for another Trinity test in Panola on a 4,000-acre block 6 miles north of Carthage. The well will be drilled on the William Cameron Lumber Co. tract, William A. LaGrone Survey. This will be the first test in that section of the county and will be watched with interest as several of the major companies have considerable acreage in close proximity.

ARKANSAS

Although there were no producers reported in Arkansas for the week, drilling activity seemed to be on the increase with six new operations in as many counties. Among the wildcats that will be watched with interest is that in Lincoln County where Lawrence B. Cook has spudded in on his No. 1 McGhee Planting Co., Section 5-8-7. Smitherman & McDonald are rigging up for their second test in Lafayette County with No. 1 Rogers, Section 17-15-22. Their first test in this county, No. 1 Reed, Section 16-15-22, recently abandoned at 1,198 feet, showed 800 feet of fluid in the hole, one-fourth oil and three-fourths water, with packer failing to shut off the water flow. Kendall Oil & Gas Co. is drilling at 778 feet on No. 1 Fullenweider, Rhea & Kitchens, Section 13-17-22, a new wildcat in Columbia County and the Starr Oil Co. has obtained a permit to drill No. 1 Cunningham, Section 11-5-16, in Hot Springs County. Two other locations were made in the proven areas of Ouachita and Union Counties.

LOUISIANA

Louisiana furnished the only two producers reported for the week, both small pumpers in the Zwolle Field. W. M. Coates completed his No. 3 Sabine Lumber Co., Section 1-7-12, making 50 bbls. from 2,322 feet, and Lide and others put their No. 1 Ponder, Section 15-7-11, on the beam with production of 10 bbls. from 2,800 feet. A wildcat of importance which was abandoned was Baird Brothers and others' No. 1 Whittaker, Section 30-20-7, Claiborne Parish, found dry at 3,000 feet. Joe Marr and others abandoned their No. 1 Maxwell, Section 33-3n-8e, in Concordia Parish at 3,622 feet. The Red Hawk Oil Co., in Webster Parish, set 6-inch casing at 2,764 feet in No. 1 Matthews, Section 11-23-9, and bailed 2,400 feet of fluid from the hole when casing collapsed. The well had a good show of oil at a total depth of 2,797 feet.

Daily Average Runs

The fields showed a net increase of 875 bbls. in daily pipe line runs for the week. The Zwolle Field, due to flush production in the new southeast extension, increased 1,000 bbls. daily which served to offset small decreases in the other fields. Daily runs for the several pools were:

NORTH LOUISIANA

Caddo, light	7,360
Caddo, heavy	2,790
Homer	3,250
Haynesville	5,705
DeSoto-Red River	2,695
Elm Grove	505
Bellevue	580
Cotton Valley	4,865
Urania	4,520
Pleasant Hill	425
Sarepta-Carterville	1,240
Zwolle	8,345
Holly	545
Total North Louisiana	39,825
Total previous week	39,045
Increase	780

ARKANSAS

El Dorado	3,625
Smackover, light	4,255
Smackover, heavy	31,610
Stephens	840
Nevada	1,090
Lisbon	720
Champagnolle	2,995
Bradley	50
Urbana	1,860
Total Arkansas	46,955
Total previous week	46,860
Increase	95
Total both states	86,780
Total previous week	85,905
Increase	875

LOUISIANA-ARKANSAS PROVEN AREAS

NORTH LOUISIANA

BOSSIER PARISH

Company, farm and location— Remarks:

H. I. Morgan's No. 13-A Kendrick, 669 ft. E, 330 ft. S, NW cor. SE SE, Sec. 22-19-11.... Drlg. black shale 1,662 ft.

CADDO PARISH—GREENWOOD

Calatex O. & G. Co.'s No. 1 Edgar, 1,460 ft. S, 1,900 ft. E, NW cor., Sec. 17-16-16.... Temporarily abd.

Calatex O. & G. Co.'s No. 1 McAnn-Alfred, 1,310 ft. S, 970 ft. E, NW cor., Sec. 17-16-16.... Location temporarily abd.

CADDO PARISH—OIL CITY

Trio Corp.'s No. 1 Levee Board, 212 ft. S, 500 ft. E, NW cor., Sec. 17-20-15.... 1,220 ft. oil in hole 2,265 ft.

CADDO PARISH—PINE ISLAND

Haynes Bros.' No. 2 Spell, 956 ft. W, 200 ft. N, SE cor. SE, Sec. 15-21-15.... S.D. 3,962 ft.

J. T. McCormick's No. 1 C. B. Christian, 330 ft. S, 300 ft. W, NE cor. SW, Sec. 27-21-15.... Location.

Shreveport Oil Corp.'s No. 2-B Muslow, 1,000 ft. S, 300 ft. E, NW cor., Sec. 32-21-15.... Began May 1; set 10-in. 40 ft; drlg. 700 ft.

Simplex Oil Co.'s No. 1 Youree-Glassell, 500 ft. N and E, C, Sec. 13-20-15.... Set 10-in. 150 ft; S.D.

MOREHOUSE PARISH

Bahan & Bahan's No. 4 Feazel, 900 ft. W, 330 ft. S, NE cor., Sec. 2-20-4.... Location.

OUACHITA PARISH

Jordan Drlg. Co.'s No. 7 Cole, 265 ft. S, 1,459 ft. W, NE cor., Sec. 49, in Sec. 50-18-4.... Location.

United Carbon Co.'s No. 6 Spade, 1,180 ft. S, 140 ft. E, NW cor., Sec. 27-19-4.... Location.

RICHLAND PARISH

Hope Prod. Co.'s No. 2 C. M. Noble Hrs., 2,538 ft. W, 1,980 ft. S, NE cor. SE, Sec. 36-16-5.... Drlg. 2,288 ft.

Palmer Corp.'s No. 1 Clement, 3,960 ft. N, 1,320 ft. E, SW cor., Sec. 10-16-6.... Began Apr. 29; set 12½-in. 170 ft; 9-in. 865 ft.

Southern Carbon Co.'s No. 1 J. O'Neal, 660 ft. N, 760 ft. E, SW cor., Sec. 36-17-6e.... Drlg. 2,365 ft.

Southern Carbon Co.'s No. 2-B Thomason, 1,980 ft. S, 3,980 ft. W, NE cor., Sec. 23-16-6.... Drlg. plug 2,285 ft.

United Carbon Co.'s No. 1 Mann, 1,320 ft. S, 1,921 ft. W, NE cor., Sec. 12-16-5e.... Completed May 2; 12,736,000 ft. gas 2,450 ft.

United Carbon Co.'s No. 2 Cooper, 660 ft. N, 3,551 ft. E, SW cor., Sec. 13-16-6.... Location.

(Continued on Page 114)

WILDCAT OPERATIONS IN LOUISIANA-ARKANSAS

(Rotary operations unless otherwise designated)

NORTH LOUISIANA

BIENVILLE PARISH

Company, farm and location— Remarks:

Coyle Bros.' No. 1 Lawhorn, 300 ft. N, 300 ft. E, SW cor. SE NE, Sec. 15-16-8.... S.D. 2,854 ft.

BOSSIER PARISH

Andrews & Davlin's No. 1 Nattin, 100 ft. N, 250 ft. W, C, Sec. 15-22-14.... S.D. 2,950 ft.

Flint River Oil Co.'s No. 1 C. L. DeMoss, 200 ft. S and E, NW cor. SE NW, Sec. 22-23-13.... Drlg. 1,635 ft.

Dr. W. N. Hankins' No. 1 Newell, 300 ft. S and W, NE cor., Sec. 12-19-11.... Drlg. 380 ft.

D. L. Perkins' No. 1 Ardis & Co., 1,127 ft. N, 198 ft. E, SW cor., Sec. 13-15-11.... Derrick pattern.

D. L. Perkins' No. 1 J. W. Glassell et al, 560 ft. N and W, SE cor. NE, Sec. 23-15-11.... Location.

Rombaugh et al's No. 1 Allison, SW SE, Sec. 10-19-13.... Arranging to deepen; T.D. 1,600 ft.

CADDO PARISH

Garry M. Gordon's No. 1 Hatcher, 560 ft. E, 600 ft. S, NE cor. NW, Sec. 11-17-15.... Location abd.

Pelican Nat. Gas Co.'s No. 1 Cooper et al, 1,310 ft. E, 1,064 ft. S, NW cor., Sec. 29-18-14.... Drlg. sandy shale 2,400 ft.

United Prod. Co.'s No. 1 Emmons, 1,327 ft. E, 660 ft. N, SW cor., Sec. 27-23-16.... 38,516,000 ft. gas 5,570 ft.

United Gas Public Service Co.'s No. 1 M. K. Smith, 660 ft. S, 2,640 ft. W, NE cor., Sec. 33-23-16.... Rig up.

United Gas Public Service Corp.'s No. 1 Fortner, 330 ft. S, 330 ft. E, NW cor., Sec. 5-22-16.... 29,748,700 ft. gas 5,591 ft.

CALDWELL PARISH

Carter Bell's No. 1 Taylor, 150 ft. S, 150 ft. E, NW cor. NE SE, Sec. 17-14-4.... Derrick.

Hudson et al's No. 1 Burton, Sec. 35-12-2e.... S.D. 2,799 ft.

CATAHOULA PARISH

National Drlg. Co.'s No. 1 Marsh McMiller, 70 ft. N, 100 ft. W, C, Sec. 26-9-6.... S.D.; W.O. 3,097 ft.

CLAIBORNE PARISH

Baird Bros. et al's No. 1 Whittaker, 600 ft. N, 400 ft. W, SE cor. NE, Sec. 30-20-7.... Dry and abd. 3,000 ft.

CONCORDIA PARISH

Joe Marr et al's No. 1 Maxwell, C, Sec. 35-3n-8e.... Abd. 3,622 ft.

United Gas Public Service Co.'s No. 1 Hughes, 660 ft. S, 45° 30" E, 660 ft. N 66° 30" E of NW cor., Sec. 49-8-10.... Began May 2; set 12½-in. 198 ft.

DE SOTO PARISH

Dupree-Fountain's No. 1 J. M. Nabors, 250 ft. S, 250 ft. W, NE cor. NW, Sec. 5-13-11.... Coring 2,425 ft.

(Continued on Page 114)

Important Tests on Texas Gulf Coast

Barbers Hill and Refugio Extension Wells and Tests in Victoria County Are of Particular Interest. Field Overproducing

By Nell Williams
Staff Correspondent, Gulf Coast Fields

HOUSTON, Tex., May 11.—With the exception of Barbers Hill, where active development of the west flank pool is expected to result in a series of additional good wells and consequent substantial gains in that field's output, interest on the Gulf Coast the next few weeks probably will be centered largely on the Victoria and Refugio County area. In those counties a number of important wildcats will bear watching in view of their location within a line of play which has given considerable promise of major development.

Of immediate interest is United Production Corp.'s No. 1-A Fox, a wildcat northeast of the Refugio Field, which has cemented 5½-inch casing (O. D.) at 5,877 feet to test a sand found at 5,879-86 feet. On a drill stem test this sand showed up better than sand tested in the Refugio Field. With a quarter-inch stroke on the testing tool and a three-eighths-inch choke on top of the drill stem, the test showed a steady flow of oil for 14½ minutes, when the tool was closed. Following this the test sprayed oil for 30 minutes and when the drill stem was pulled 14 fourbles of oil were recovered.

This test is located in the L. Brown Survey and is between 1,500 and 2,000 feet to the northward from what is known as the Lambert Pool, which is approximately 2 miles northeast of the main Refugio Field. In the Lambert Pool, opened early in 1930 by United Production Corp.'s No. 1 M. F. Lambert, three commercially productive wells have been completed from a horizon around 5,800-5,900 feet. Due to failures of several deep tests to the east and south, the area was not looked upon with favor. Several deep dry holes between it and the Refugio Field isolated it and drilling ceased until the Fox test was started. The latter is the first test drilled to the north of the discovery well and may prove the field to lie in that direction. The horizon in this area is different from any in the main Refugio Field, where deep production is obtained from what are known as the 5,500-foot, 5,700-foot and 6,400-foot sands.

In a line with this Fox test, the Refugio Field and other fields, such as Kingsville, Saxet and White Point, further down the coast, as well as with the Bloomington-Marianna district to the east in Victoria County, Humble Oil & Refining Co. is to drill an important wildcat in the northeastern part of Refugio County. This is No. 1 O'Connor (Keating), located in the John Keating Survey, 6,012 feet southward along the southeast line from the northeast corner of the Rios Survey and thence 7,375 feet westward at right angles. This is about 4 miles westward from The Texas Company's No. 2 McFaddin, C. M. B. Hoyd Survey, southwestern Victoria County, a wildcat gas well now shut in, which in turn is about 4 miles to the west of Lion Oil & Refining Co.'s two gas wells in what is known as the Bloomington district.

Wildcatting in Victoria County

Victoria County has been and is receiving more interesting wildcat development than any other part of the Gulf Coast. In addition to the Humble Oil & Refining Co.'s test located just over the line in Refugio County from the Bloomington-Marianna area, United Production Corp. is starting drilling in its No. 4-A McFaddin. The latter is located over a half mile to the northwest of the company's two gas wells, Nos. 1-A and 2-A (drilled by Lion Oil & Refining Co.) and is of particular importance in view of the fact that tests to the east, west and south of the two gas wells proved failures, leaving the north and northwest the only direction open for the field to go. The Texas Company's wildcat gasser, previously mentioned, is some 3½ miles to the west but it is from an entirely different horizon and a deep dry test between it and the United wells indicates the existence of two separate structures.

Some 3½ miles to the north of this area on a large block, T. B. Slick interests are drilling a wildcat, No. 1 McFaddin, located in the J. Vairan Survey, which is being watched closely for possible connection with the Bloomington development. This test late in the week was drilling below 2,050 feet after having made a dry drill stem test of a sand at 1,804-28 feet.

Following in the same general trend of development is Simpson, Fell and Westheimer's No. 1 Levi, S.A.&M.G. Survey No. 4, some 15 miles to the northeast. This test, drilling around 2,100 feet, is being put down in one of the "windows" in a large block recently obtained by Shell Petroleum Corp., and based on the geological and geophysical exploration of the latter company, this area is promising.

Further up the trend, Houston Oil Co. is rigging up for its first wildcat on what is known as its Beck block, northeastern Victoria County. This test, No. 1 Conrad, is in the T.&N.O. Survey No. 1, 1,100 feet from the southwest line and 100 feet from the northwest line, approximately 8 miles northeast of the town of Victoria.

Except for the three gas wells, two drilled by the Lion Oil & Refining Co. and one by The Texas Company, in the Bloomington-Marianna district, there is no production in Victoria County. The county first received considerable attention about a year and a half ago when Humble Oil & Refining Co. produced a small amount of oil from a deep wildcat on its well known Nursey block in the northern part of the county. Since then, and particularly during the lease play of late 1929 and early 1930 which swept the "lower" Gulf Coast territory following the Refugio and Pettus booms, Victoria County has been actively blocked. During the past year and a half production has been opened in a half dozen different spots within this play, outside of Victoria County and a line of production development has been established fairly definitely.

Further slackening of drilling operations was indicated generally throughout the Gulf Coast the past week coincident with efforts of operators to curtail production of the Texas coastal fields in line with statewide proration schedules. Very little new work is being started anywhere, including Barbers Hill and Refugio, both of which have been in the midst of active development. At Barbers Hill, the peak development of the west flank, which has resulted in the running up of that field's production within the last several weeks, is believed to have been reached and with the completion of the present operations drilling will decline. While much acreage within the line of production remains to be drilled, extensions will take the production through areas where drilling can be controlled.

New Wells at Barbers Hill

Development at Barbers Hill the past week, however, resulted in the addition of three more wells, Humphreys Corp.'s No. 2 E. H. Winfree, which was being completed over the week end in the sand at 5,627 feet; the same company's No. 4, which came in flowing at the rate of 67 bbls. hourly, 920 pounds pressure, at 5,604 feet and Mills Bennett Production Co.'s No. 1 Gulf-Smith, the most northerly well, which is flowing 31 bbls. of fluid, 24 per cent water, 100 pounds pressure on a five-eighths-inch choke, sand 5,687 feet. The latter probably indicates the edge of the line of production for that horizon, and a northern end of the pool as far as line fighting is concerned as further extension of this line to connect the pool with that of the northwest flank probably would extend across the middle of a tract owned by Humphreys Corp., where no offsetting would be required.

Production at Barbers Hill climbed to a new peak the past week, the daily average being 30,213 bbls. This, however, was just a few barrels over the peak set two weeks ago. The output for the whole Gulf Coast area indicated very little change. The total daily average for the Texas Coast, including Pettus, thus remained around 160,000 bbls., or 20,000 bbls. above the allowable.

Gulf Coast Production

Estimated daily average production for the week ended May 9 was:

GULF COAST PRODUCTION
Texas Coast

Allen	17
Barbers Hill	30,213
Batson	995
Big Creek	3,060
Blue Ridge	1,250
Brenham	54
Boling	653
Clay Creek	2,376
Damon Mound	1,321
DeWalt	11,643
Esperson	2,247
Fannett	472
Goose Creek	4,220
Hankamer	3,255
High Island	473
Hull	6,444
Humble	9,999
Lost Lake	281
Markham	185
Moss Bluff	381
Mykawa	137
Nash	296
North Dayton	483
Orange	1,952
Orchard	1,515
Pierce Junction	8,251
Port Neches	1,374
Raccoon Bend	8,332
Refugio	32,458
Rockland	b
Saratoga	1,053
Sour Lake	1,939
South Liberty	2,088
Spindletop	9,626
West Columbia	4,079
Total Texas Coast	152,123
Week ended May 2	152,210
Decrease	87

Louisiana Coast

Anse La Butte	69
Bayou Blue	63
Bayou Bouillon	98
Black Bayou	821
Edgerly	362
Jennings	669
Hackberry	2,556
Lake Barre	2,208
Lake Pelto	98
Leesville	1,110
Lockport	7,885
Port Barre	1,857
Sorrento	363
Starks	762
Sulphur	3,316
Sweet Lake	789
Vinton	5,534
White Castle	1,191
Total Louisiana Coast	29,748
Week ended May 2	29,083
Increase	665
Total Gulf Coast	181,871
Week ended May 2	181,293
Increase	578

Four Deep Tests Abandoned

At Refugio, the other large Coastal field, there were no successful completions but four deep tests were abandoned and no new drilling was started, which indicates a definite falling off of work in that area. The deep tests abandoned were in outlying locations around the 6,400-foot field, and, being dry, served to help define the limits of the 6,400-foot production. One of these tests, however, was a junked hole at 6,126 feet, it being Houston Oil Co.'s No. 14 Pratt-Hewitt-Rooke, located on the west or op-

(Continued on Page 119)

GULF COAST FIELDS AND WILDCATS

Week Ended May 9

All Rotary

BARBERS HILL—CHAMBERS COUNTY

Gulf Production Co.'s No. 1 Wilburn (D.D.), Henry Griffith League, 50 ft. S of C of N line of tract	Set 24 ft. 3-in. screen 5,290 ft.; rigging up to pump.
Humphreys Corp.'s No. 2 E. H. Winfree, west flank. W. D. Smith Sur., 50 ft. from W line and 478 ft. S line 10-acre tract	Set screen 5,627 ft.; washing.
Humphreys Corp.'s No. 3 E. H. Winfree, west flank. W. D. Smith Sur., 264 ft. from S line and 50 ft. from W line of 10-acre tract	Set 157 ft. 5 3/16-in. screen 5,716 ft.; comp. flowing 2,392 bbls. pipe line oil, 610 lbs. pressure, 9/32-in. choke.
Humphreys Corp.'s No. 4 E. H. Winfree, west flank. W. D. Smith Sur., 50 ft. from W line and 617 ft. from S line 10-acre tract	Set screen 5,604 ft.; comp. flowing 67 bbls. pipe line oil per hour, 920 lbs. pressure.
Humphreys Corp.'s No. 5 E. H. Winfree, W. D. Smith Sur., 854 ft. from S line and 50 ft. from W line	Drlg. sand, lime and boulders 3,798 ft.
Humphreys Corp.'s No. 6 E. H. Winfree, W. D. Smith Sur., 50 ft. from N line and 50 ft. from W line of tract	Spudded.
Humphreys Corp.'s No. 1 Anna Davis, Henry Griffith League, 475 ft. from N line and 71 ft. from E line of Strip 6	Drlg. salt 2,230 ft.; top salt 1,400 ft.
Humphreys Corp.'s No. 2 T. S. Fitzgerald, Henry Griffith League, 300 ft. from N line, 65 ft. from E line of tract	Drlg. gumbo and lime 1,003 ft.
Mills Bennett Production Co.'s No. 1 Gulf-Fisher (workover), Wm. Bloodgood Sur., 50 ft. from SW line and 250 ft. from SE line tract	Drlg. sand showing oil 5,287 ft.
Mills Bennett Production Co.'s No. 4 Gulf-Fisher, Wm. Bloodgood Sur., 300 ft. from W line, 80 ft. from N line tract	Drlg. hard sand rock 1,360 ft.
Mills Bennett Production Co.'s No. 1 Gulf-Smith (workover), W. D. Smith Sur., 50 ft. from S line and 50 ft. from E line tract	Set 4 jts. screen 5,681 ft.; comp. flowing 31 bbls. fluid, 24% water, per hour, 100 lbs. pressure on %-in. choke.
Rio Bravo Oil Co.'s No. 2 Fisher, west flank	Sand and shale showing oil 4,879 ft.; cmtd. 7-in. csg. 4,867 ft.

(Continued on Page 116)

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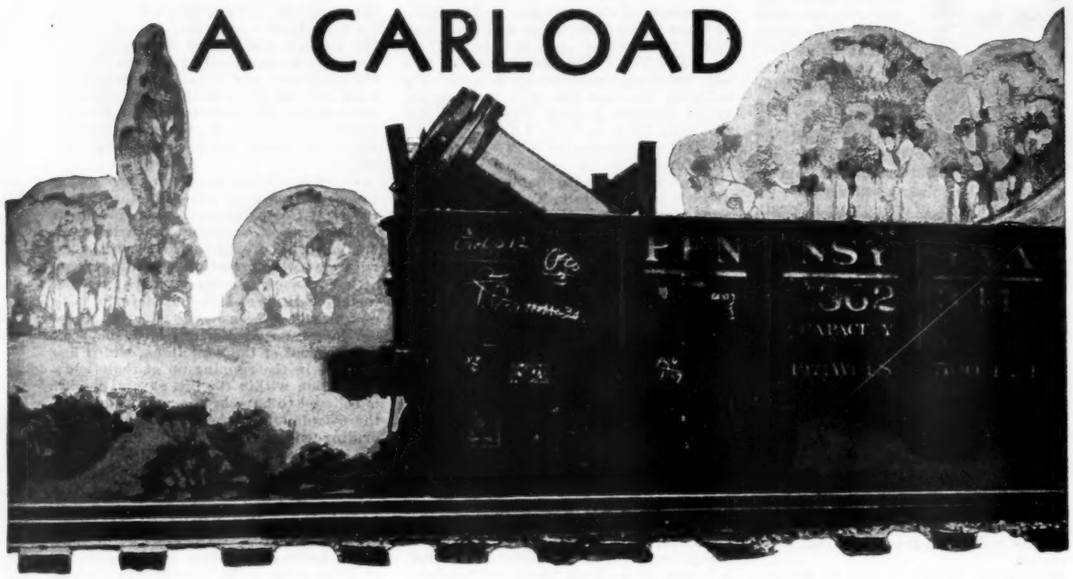

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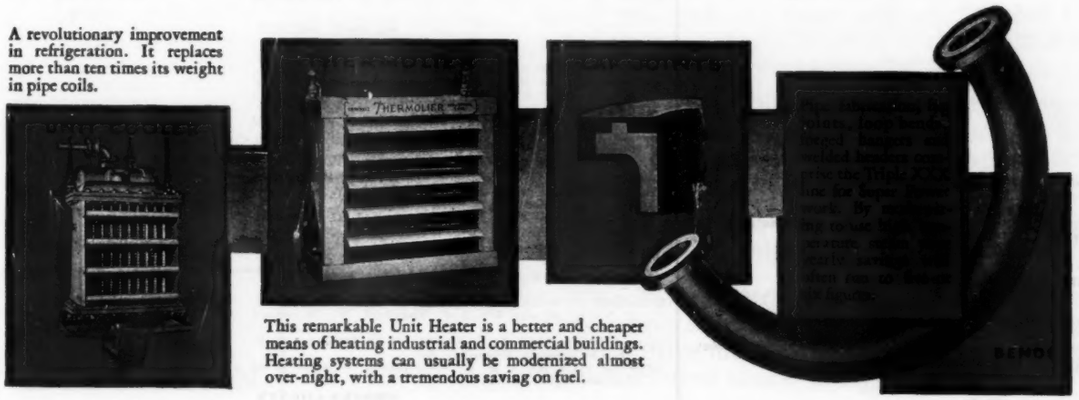

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New Pool Proven in Laredo District

Another on Verge of Being Proven East of Cole and O'Hern-Seacord Pools. Corpus Christi Area May Get Some Gas Activity

By B. D. Stevenson
Staff Correspondent, Southwest Texas Fields

SAN ANTONIO, Tex., May 11.—One new pool is proven up in the Laredo district and another was on the verge of being proven as the week closed. Lowe & Rogers in sand at 1,341-53 feet in No. 2 Benavides, Block 13, Survey 613, in northeastern Zapata County and 1½ or 2 miles west of the Mirando Valley Pool, was completed for about 40,000,000 feet of gas. Folds and trends in the Mirando district run north and south, hence it is not an extension of the Mirando Valley Pool but a new producing spot. It seems to line up with the Jennings gas field about 8 miles south and slightly west of it; otherwise, with the exception of the old Riser gas field, now depleted, which is 6 miles west of it and 15 miles north, it is the farthest west production in the Mirando district.

The other new spot in the Laredo territory is S. J. Carpenter's No. 1 Juan Benavides (carried heretofore as Gus Pape's No. 1 Juan Benavides) in Section 38 of Subdivision No. 1 of the Mesquite grant in Duval County, 1½ miles east of the Cole and O'Hern-Seacord gas and oil pools. It is a little over 1 mile west and a quarter mile north of the O'Hern-Seacord discovery well in Survey 174. At 1,670 feet, which is 100 feet or more shallower than in the fields to the west of it, a saturated core was taken which makes it look like an oil well and casing will be set and a test made. The oil showing was so good that enough was recovered to fill some bottles as samples. About 5 feet of sand was penetrated which is enough to make a pretty good well in the Laredo district.

Carolina-Texas Pool

In the Carolina-Texas Pool in Webb County, the Carolina-Texas Oil & Gas Co. completed its No. 9 Barnsley for about 30,000,000 feet of gas. It is in Block 13 of Survey 268 and is in about the center of the field and completed at 2,575 feet with sand from 2,565 feet. It is the second well to be completed in that sand. The company will soon start No. 10 Barnsley and this is the only activity at this time in that pool.

There are 29 tests listed in the Laredo district, fewer perhaps than for several years. The Lowe & Rogers' completion and the completion of No. 9 Barnsley were the only producers last week, and the only abandonment was that of a location in the Jennings-Muckelroy Pool.

E. C. Brogan's No. 1 Montemayor, about a half mile east of production in the Escobas (Jennings-Muckelroy) in Zapata County, reported last week as having a sand at 1,494-1,500 feet, and fixing to test a show of oil, had the sand all right and tested but got mainly salt water. It will probably be drilled deeper. Other than the Brogan test there are only two tests drilling in the Escobas-Muckelroy-Jennings area.

Two important completions are due this week in the extension to the Schoolfield-O'Byrne Pool in northern Duval County. Both the Magnolia Petroleum Co.'s No. 3 Wilson and The Texas Company's No. 1 Bishop Duval Land Co. have set casing, the Magnolia at 2,349 feet and The Texas Company at 2,340 feet and are waiting on cement. They offset producers and will not extend the field.

Corpus Christi Area

A contract has been signed and official notice has been given that a big chemical plant will be built at Corpus Christi. One of the features that brought the plant there is the availability of natural gas in that territory for fuel. This fact is also expected to result in making a market for a considerable amount of shut-in gas in that territory and may also result in operators doing a little additional wildcatting. To start with, the plant will consume about 15,000,000 feet of gas daily but will probably greatly increase that amount later.

In the Saxet Field west of Corpus Christi the Saxet Oil Co.'s No. 8 Dunn late last week was at 3,300 feet and by the time this is being read should be near the 4,300-foot sand which is producing in Nos. 6 and 7 Dunn of the same company. It is 1,000 feet north of No. 7 Dunn.

The only two other tests in that district that are active are the Gulf Coast Oil Co.'s No. 1 Harrell and L. L. Smith's No. 1 Hunter. They are very interesting and important tests. No. 1 Harrell is about midway between the O. C. Best gas well 2½ miles due west, producing gas at 4,037 feet and the Saxet Oil Co.'s No. 7 Dunn the same distance due east and producing oil and gas at 4,296 feet. It is a little over a half mile north of Moody-Seagraves' No. 1 Sedwick producing oil and gas at 4,097 feet. No. 1 Harrell was below 2,000 feet and drilling last week and L. L. Smith's No. 1 Joe Hunter, between it on the north and No. 1 Sedwick on the south, was down about 1,000 feet. Nothing has ever been drilled north of the Gulf Coast Oil Co.'s No. 1 Harrell except The Texas Company's No. 1 Driscoll 2 miles and over to the northeast and abandoned at 4,600 feet. The wells thus far completed in this area at around 4,037-4,300 feet have been pretty prolific as gas producers but small oil producers, though only a few tests have been completed so far. These tests to the north may run into bigger oil production. At least they will test the width of the area.

Pettus District

The Pettus district is featured again this week with another extension to the east of about 900 feet. The United Production Co.'s No. 38 Ray, 900 feet east and 10 degrees south of No. 35, has topped the sand at 3,974 feet and set casing and should be ready to complete this week. This makes approximately 1 mile east that the company has extended the field from the discovery well in a straight line with five producers located 1,000 feet apart.

The company is making a long jump for the next test which is No. 37 Ray, about 6,500 feet southeast of No. 38. No. 37 is about 1,500 feet north of No. 11 drilled a year ago and which blew out at 3,815 feet and ran wild and was lost. It is also 4,500 feet southwest of No. 3 Ray also drilled a long time ago and which made a 15-bbl. oil well at 4,060 feet.

Three miles north of Pettus in a spot on the George Habbermacher Survey where there are two producers and one dry hole drilled a year or more ago and completed at around 3,680 feet, Gulf Coast Oil Co. is drilling No. 2 McKinney and is down below 3,000 feet. It is 1,200 feet west of William F. Morgan's No. 1 McKinney, a gasser at 3,680 feet and the discovery well in that area. The dry hole was drilled to the southeast.

J. M. Davis should get spudded in on his No. 1 Ray at the southwest corner of the Pettus Townsite this week and Mauldin & Fisher's No. 1 Kimball, 7 miles to the southwest, looks like a small well of possibly 75 bbls. but is not complete. It headed when swabbed after a coarser screen had been set.

Carsil Oil & Gas Co. was down 2,700 feet in its No. 2 McGill in the north central part of Jim Wells County late in the week. It is 900 feet due north of No. 1 which made a gas well at 2,690 feet. No. 2, to get the same sand, must find it soon.

Balcones Fault Zone

In the Balcones fault zone east of San Antonio V. G. Schimmell and others' No. 1 J. C. Williams in the southwestern part of Bastrop County at 1,997 feet had 317 feet of Serpentine and set casing to test a showing of oil. It is 2 miles south of the Yoast Field which is producing in the same formation.

In Caldwell County, M. O. Rayor, midway between the Bruner and Luling Fields, lost No. 1 Dunlop with a bad fishing job at 2,368 feet and is skidding over to start a new hole.

Harry J. Bruner has started No. 1 Jim Sherrill in the George Allen League in the northern part of Guadalupe County near Staples where some shallow production was practically proven by tests drilled by a major company a few years ago.

Heavy rains slowed things up in the Real-Kerr County district. Most of the tests had to shut down for several days.

(Continued on Page 119)

SOUTHWEST TEXAS PROVEN AREAS

DOBROWOLSKI POOL—BEXAR COUNTY

Company, farm and location—	Remarks:
Morgan Bros.' No. 2 Masterson, 300 ft. S of No. 2 Masterson, Miguel Gortaris Sur.	T. D. 550 ft.; set csg.
Collins and Morris' No. 10 Halberdier, J. M. F. Perez Sur.	T. D. 410 ft.; drlg.
Boling & Michael's No. 1 Adams, Miguel Gortaris Sur.	T. D. 700 ft.; (W.O.).
Gatlin Oil Co.'s No. 7 I. A. Beck, 150 ft. SW line, 1,351 ft. SE line of tract, Montez Sur.	Location.
Patton & Yocum's No. 1 T. Strunk, 1,351 ft. from SE line, 150 ft. from NE line of tract	T. D. 210 ft.; drlg.
W. S. Rogers et al's No. 1 L. Donnop, Juan Montez Sur.	T. D. 400 ft.; shut down.
A. J. Swearingen's No. 6 Sandemer, 600 ft. S of No. 1, M. Manchaca Sur.	Location.
A. J. Swearingen's No. 7 Sandemer, 300 ft. S of No. 6, M. Manchaca Sur.	Location.

BRUNER POOL—CALDWELL COUNTY

Joe Bruner's No. 1 Malone, A. Floyd Sur.	T. D. 50 ft.; drlg.

EDDINGTON POOL—FALLS COUNTY

Eddington et al's No. 3 Llewellyn, George Allen Sur.	T. D. 1,070 ft.; drlg. shale.

DARST CREEK FIELD—GUADALUPE COUNTY

Magnolia Pet. Co.'s No. 8 M. T. Klein, 300 ft. SE of No. 1	T. D. 1,600 ft.; drlg.

CHAPMAN POOL—WILLIAMSON COUNTY

Chapman et al's No. 3 Lawrence, S. Miller Sur.	T. D. 1,916 ft.; set 6⅝-in. csg.; waiting on cement.
Ertel et al's No. 9 J. C. Abbott, 842 ft. from W and 150 ft. from S line of farm in S. Miller Sur.	T. D. 150 ft.; drlg.
Vitex Oil Co.'s No. 8 Kilgore, Simon Miller Sur.	T. D. 1,735 ft.; waiting on cement.

PETTUS AREA—BEE COUNTY

J. M. Davis et al's No. 1 Ray, 330 ft. from N and E lines of John W. Williamson Sur.	Rigging up.
J. L. Mauldin's No. 1 fee, 1,300 ft. N of S line, 150 ft. E of Medio Creek, Kerr Sur.	T. D. 3,862 ft.; standing.
Gulf Coast Oil Co.'s No. 2 McKinney, 2,400 ft. to E and 150 ft. to S line of tract	T. D. 3,840 ft.; drlg.
United Prod. Co.'s No. 32 Ray, G. Habbermacher Sur.	T. D. 3,925 ft.; drlg.
United Prod. Co.'s No. 37 Ray, 3,300 ft. from SW line, 996 ft. from SE line of Willis A. Moore Sur.	T. D. 420 ft.; set surface csg.
United Prod. Co.'s No. 38 Ray, 900 ft. E, 10° S of No. 35 Ray	T. D. 3,974 ft.; topped sand; set csg.

(Continued on Page 115)

WILDCAT OPERATIONS IN SOUTHWEST TEXAS

ATASCOSA COUNTY

Company, farm and location—	Remarks:
Tom Draper's No. 1 A. W. Schwarz, 185 ft. E of center of W line	T. D. 695 ft.; drlg.
Pacific Oil & Gas Co.'s No. 1 Harris, G. Van Norman Sur.	T. D. 795 ft.; standing.

BLANCO COUNTY

Hardy-Sitton's No. 1 McMillan	T. D. 796 ft.; drlg.
Liles-Adams et al's No. 1 Stanford, 150 ft. to S line, 1,420 ft. to E line of James Stanford's No. 155	T. D. 970 ft.; fishing.
McCleary et al's No. 1 Schenling, 900 ft. to SE line, 600 ft. to S line of J. A. Rouse No. 118 Sur., 4 miles SW from Blanco City	T. D. 574 ft.; shut down.
J. R. Meek's No. 1 Walker, 360 rds. from W line, 482 rds. from S line of 375-ac. tract in Sur. No. 32	T. D. 1,047 ft.; drlg.
C. Rosenfield's No. 1 Hohenberger, 800 ft. to W line, 1,260 ft. to N line, Sur. No. 94	T. D. 712 ft.; shut down.

BASTROP COUNTY

Smith & Barnes' No. 1 Marberger, 450 ft. W line, 1,360 ft. S line of tract in King & Millet Sur.	Location.
Texas Petroleum Products Co.'s No. 1 J. C. Williams, 2,200 ft. E line, 180 ft. N line of farm, James Doyle Sur.	T. D. 1,997 ft.; setting csg. to test.

BELL COUNTY

Hartman et al's No. 1 M. E. Reed, Nancy Roberts Sur.	T. D. 907 ft.; showing oil; shut down.
Mildon Oil Co.'s No. 1 J. K. Edds, Maxiano Moreno Sur.	T. D. 519 ft.; drlg. shale.
C. O. Alford et al's No. 2 F. Spankell, W. Woodford Sur.	T. D. 761 ft.; abandoned.
C. O. Alford's No. 1 A. L. Keifer, 150 ft. from S and W lines of tract in Woodford Sur.	Location.
Vilas Oil Co.'s No. 1 B. F. Whittington, 9 miles E of Holland	Moving in rig.

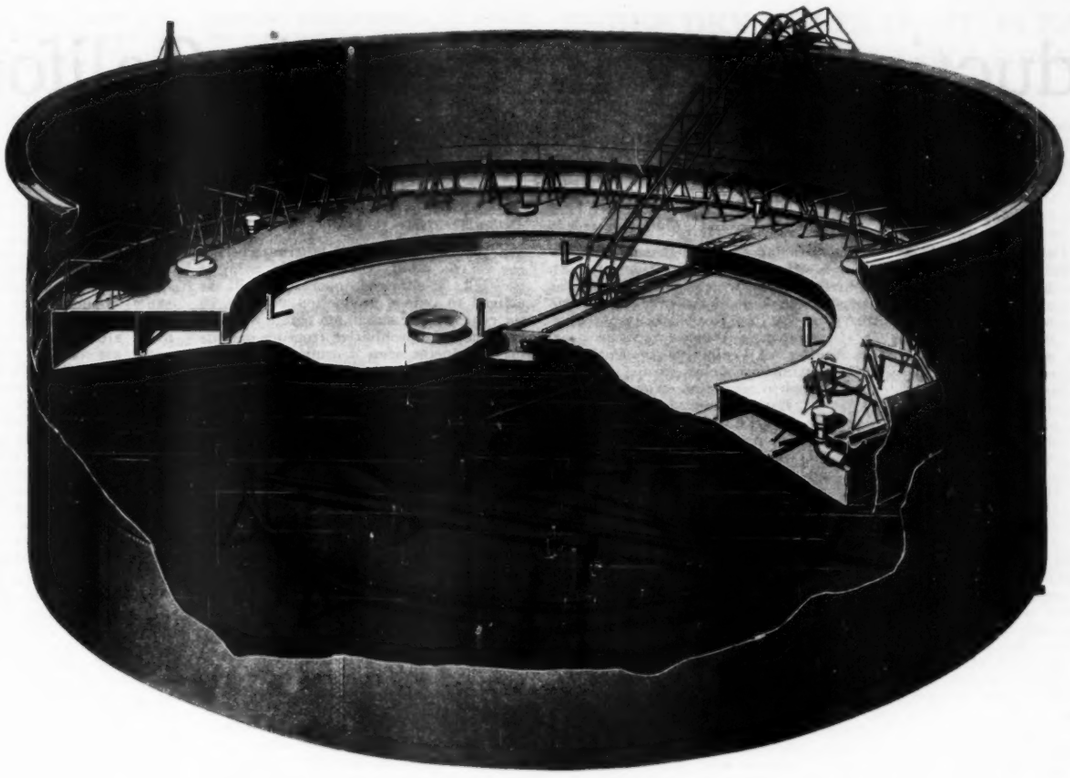
BROOKS COUNTY

Ike Howeth's No. 1 Singer, 400 ft. E of Humble's No. 1 Singer	Rigging up.
The Texas Company's No. 1 Allen, San Antonita grant	T. D. 850 ft.; drlg.

BEE COUNTY

Alexander et al's No. 1 McFall, 3 miles south Skidmore	T. D. 1,100 ft.; drlg.
Catlell & O'Neill's No. 1 Miller, Ronald Hotchkiss Sur.	T. D. 4,516 ft.; abandoned; dry.
Grebin & Woods' No. 1 Riggs, 4,800 ft. to E line, 200 ft. to N line of Jas. Nowland Sur., 6 miles W of Skidmore	Rigging up.

(Continued on Page 115)



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Production May Increase in California

Due to Projected Completions in Kettleman Hills Field During Next 60 Days. Conservation Bill Being Delayed

By L. P. Stockman
Staff Correspondent, California Fields

LOS ANGELES, Calif., May 9.—Production of crude oil in California, which has been hovering around 525,000 bbls. per day for the past several months, is expected to register a substantial increase during the course of the next 60 days due to projected completions in the prolific Kettleman Hills Field of Kings County. The Petroleum Securities started the ball rolling by recompleting No. 1 Felix flowing at the rate of 20,000 bbls. per day and unless something unforeseen develops, two or three additional wells should be finished before the present month draws to a close. This indicates that Kettleman Hills will be doing in excess of 50,000 bbls. per day within the next four or five weeks unless something is done to curb the flow of new wells.

The Standard Oil Co. finished a new well in the North Dome late this week when No. 21 in Section 7-22-18 came in under a natural flow doing 7,125 bbls. of clean 36 gravity oil and 2,600,000 feet of gas per day from 8,091 feet. This makes a total of 10 wells producing in the North Dome of Kettleman Hills although 3 or 4 at present producing from the Elliott zone or upper part of the Tebmlor will eventually be killed and deepened to the Ochsner zone because of their excessively high gas-oil ratio. This well clearly shows the abnormally low gas-oil ratio characteristic of the Ochsner zone indicating that the Sharkey bill offers the only hope of relief as the California gas conservation law is not applicable because of low gas-oil ratio of the deep zone.

Senate Bill No. 362, sponsored by Senator Will Sharkey, has encountered considerable opposition in the state legislature, although it is the general consensus that it will ultimately be enacted. It is doubtful, however, whether this bill will become an important factor until later in the year as it will take some little time to perfect the mechanics of operation after its passage. If any unnecessary delay is encountered in enforcing the mandates of the bill or the legislation lost between now and May 15 when the legislature adjourns, Kettleman Hills may be doing at least 100,000 bbls. per day early this summer. It is quite obvious that it will not require many additional 10,000 or 20,000-bbl. wells to step current production up to the 100,000-bbl. mark.

Eight additional high pressure gas traps have been installed by the Petroleum Securities and the company's big well, No. 1 Felix, will be turned loose within the next few days. This well, rated between 15,000 and 20,000 bbls. per day, has been held back because of the inability of the original installation of gas traps to handle the well's capacity. A further delay has been experienced because of the inability of the Associated Oil Co. to move such a substantial quantity of crude oil out of Kettleman Hills on such short notice. The Associated's original contract with the Petroleum Securities specified a maximum quantity of 7,500 bbls. per day at a minimum price of $1.10 per bbl. This contract has been subsequently modified both as to the price and the maximum to be run by the Petroleum Securities. The Associated has been reconditioning its Coalinga-Monterey pipe line and will be in a position to move a substantial quantity out of Kettleman Hills if it chooses to do so. The Coalinga-Monterey line will permit the company to move Kettleman Hills oil from Kettleman Hills to tidewater at Monterey, from which point it can be moved by tankers to either the Avon refinery in the San Francisco Bay region or the company's Watson refinery near Los Angeles. All collars on the Coalinga-Monterey line are being welded and the line restored to maximum efficiency.

Early Completions

During the next 30 days the Kettleman North Dome Association should finish No. 2-1P and possibly No. 37-34J also. The Standard is expected to bring in No. 21-7Q during the same period and will probably have No. 21-33J and No. 65-29J tanking oil early in June. The Superior, which is building a 175-foot steel derrick to be used in the drilling of No. 3 Huffman, will probably finish No. 2 Huffman late in May or early in June. The Union Oil Co. should, barring any unforeseen delay, complete No. 1 Amerada-King during July. These projected completions, together with several more scheduled to be brought in during the course of the next three or four months, will give Kettleman Hills an exceptionally high potential and result in a high actual daily production. The Shell is making exceptionally good progress with No. 1 Dixon in Section 36-21-17 and this well should be finished within the next 30 days.

The flush production of high gravity oil expected at Kettleman Hills will undoubtedly exert an unfavorable effect on settled production in older fields of the State. This is of particular significance as Kettleman Hills may dominate the price structure on the Pacific Coast during the next several years. If this condition develops, and all evidence points in this direction, prices of crude and refined oil cannot be expected to register any substantial increase for another year or so. Many independent operators have been expecting an early upward revision in both crude and refined oil prices but fundamentally there is very little basis for any immediate revision. The entrance of Kettleman Hills into the picture practically precludes any appreciable increase in prices, although gasoline prices are expected to stiffen during the summer months. This will be an abnormal condition, however, and cannot endure in view of the heavy overproduction of crude oil.

Effect on Small Pumpers

As the situation looks at the present time, small pumping wells in California will not prove profitable during the next year or two. This will be true whether the Sharkey bill is enacted or not. If the bill is enforced, operators will be obliged to reduce production perhaps 75 per cent of their maximum potential. This is practically prohibitive from an operating standpoint even if crude prices were increased. On a wide open flow small wells could not even compete with the flush production of Kettleman Hills. It is quite obvious that many operators will be obliged to suspend production until conditions improve, irrespective of whether production is curtailed by compulsory regulation or permitted to go unrestricted. Under the Sharkey bill, the amount of curtailment necessary will depend upon the amount of potential production established at Kettleman Hills. If a sufficient number of wells are drilled in the North Dome to give this field a rated potential of 500,000 bbls. per day, and this can be done by additional drilling, it will force the rest of the State to effect a drastic curtailment. Kettleman Hills would, of course, be obliged to effect a similar percentage of curtailment. It is the general opinion among those in close touch with the situation that Kettleman Hills operators would rather retard production and keep the potential production low as this would permit better prices for crude and refined oil. If this can be done, and operators will undoubtedly work to this end even under the Sharkey bill, it will assist independent operators who otherwise would be on the border line between profitable operation and uneconomic production. The chief thought at the present time is that the oil business on the Pacific Coast is facing an extended period of depression. The Sharkey bill even if enacted will only alleviate conditions and is not expected to be a permanent cure.

Possible New Field

York & Smullin are believed to have possibly discovered a new field in the Watson area of Los Angeles Basin but this will not be definitely determined until additional development is undertaken. The uncertainty which exists is due to the proximity of their No. 1 Watson in Section 29-4-13 to existing Torrance Field. It is significant to note, however, that projected production contours of the Torrance Field failed to tie in with the top of the oil sand encountered in this new well. This has led to the supposition that there may be a saddle in the east end of the Torrance Field. York & Smullin's new well looks good for about 150 bbls. of 21.1 gravity oil per day from 3,698 feet, although the project has not been on consistent production due to sand trouble. The importance of this completion is rather difficult to determine although several petroleum engineers are of the opinion that York & Smullin's No. 1 Watson is on the western end of a new structure located approximately 2 miles east of Torrance. This new well is of particular significance because of its proximity to the refineries and tank farms of the Union, Shell, Richfield, Associated and The Texas Company in the Watson area. The existence of a field in this area would eliminate pipe line transportation but would not fit in the general scheme of things from a refining standpoint.

Ventura Avenue

Three more wells were put on production in the Ventura Avenue Field during the past week and a check indicates the probability that several more will be tanking oil within the next 30 days. Since the first of April nine wells have been completed by the Associated and Shell in the Ventura Avenue Field. In addition to this, the Associated discovered a new deep and highly productive horizon when No. 57 Lloyd was finished at 8,823 feet. The Shell chalked up two of the three completions listed during the current week. These were Nos. 65 and 66 on the Taylor lease, the former being finished at 5,783 feet and the latter at 5,857 feet. No. 65, which blew in during the course of a water test flowing 1,106 bbls. of 30.7 gravity oil, shows a casing pressure of 910 pounds and a tubing pressure of 250 pounds. No. 66 Taylor, a recompletion, is flowing 2,220 bbls. of 30.4 gravity oil under a casing pressure of 470 pounds. The Associated increased its list of producers this week by finishing No. 104 Lloyd flowing 660 bbls. of 29.5 gravity oil and 2,465,000 feet of natural gas per day from 7,182 feet. This new well was still cutting in excess of pipe line requirements late in the week but appears to be cleaning up in good shape and may ultimately become a commercial producer. The Associated started swabbing No. 15 V.L.&W. late last night and this new well may be on production within the next few hours. The numerous completions in the Ventura Avenue Field during the past six weeks is the culmination of drilling started several months ago and, while the new production added increases the potential of this field, current production is being held in restraint in conformity with the existing curtailment program.

Two new wells are expected to be completed in the Rincon Field of Ventura County within the next 10 days. On Permit No. 55 the General Petroleum is expected to finish No. 2 Needham as a successful water shutoff was recently secured at 2,924 feet, although two cement jobs were required. Preparations are being made to land the oil string on bottom at 3,029 feet preparatory to an early test. This well is located on tideland permit approximately 1,500 feet from the shore line. The Honolulu Consolidated is also expected to complete a tideland drilling project in the Rincon Field shortly. This company's No. 2 on tideland permit No. 66 is bottomed at 2,930 feet with a 13⅜-inch water string cemented at 2,917 feet.

Capitan

The Oakburn Oil Co., a subsidiary of the General Petroleum, had the misfortune to experience a gas blowout in its initial test on the Sperry Tideland Permit No. 160 in the Capitan Field of Santa Barbara County. This well, located approximately 500 feet from the shore, was down 2,820 feet when the blowout occurred. The Vaqueros was topped in this well at 1,240 feet and the red shale

TANKER SHIPMENTS FROM LOS ANGELES TO ATLANTIC AND GULF COAST PORTS

Commodity—	Total this week	Daily average	Total last week	Daily average	This year to date	Same time last year
Crude oil	.....	.....	.....	.....	.....	77,405
Fuel oil	.....	.....	.....	.....	.....	71,950
Diesel and gas oil	93,501	13,357	.....	.....	892,230	1,536,369
Gasoline	471,034	67,291	285,409	40,773	5,303,664	5,941,623
Kerosene	.....	.....	.....	.....	41,512	.....
Coastwise—						
Crude oil	673,206	96,172	465,606	66,515	7,320,745	5,450,053
Fuel oil	93,692	13,385	259,335	37,048	4,747,041	6,086,148
Diesel and gas oil	30,769	4,396	31,375	4,482	566,667	652,364
Gasoline	304,546	43,507	221,004	31,572	4,238,003	3,827,400
Kerosene	7,400	1,057	5,771	824	132,303	52,509
Naphtha distillate	.....	.....	.....	.....	4,952	.....
Exports—						
Crude oil	133,852	19,122	150,505	21,501	2,351,715	2,206,579
Fuel oil	247,325	35,318	348,517	49,788	5,105,938	6,312,710
Diesel and gas oil	63,994	9,142	69,103	9,872	1,250,367	1,793,543
Gasoline	151,143	21,592	107,224	15,318	3,430,811	5,266,570
Kerosene	.....	.....	5,453	779	559,229	1,522,476
Lubricants	.....	.....	.....	.....	18,978	10,082

TANKER SHIPMENTS FROM SAN FRANCISCO TO ATLANTIC AND GULF PORTS

Diesel and gas oil	.....	.....	.....	.....	.....	88,280
Gasoline	79,915	11,416	.....	.....	267,499	440,188
Lubricants	.....	.....	.....	.....	14,015	2,946
Coastwise—						
Fuel oil	88,914	12,702	74,512	10,645	1,453,588	1,398,693
Diesel and gas oil	.....	.....	.....	.....	88,756	124,462
Gasoline	57,996	8,285	59,617	8,517	991,239	1,417,136
Kerosene	12,009	1,716	4,964	709	100,382	106,349
Exports—						
Crude oil	.....	.....	.....	.....	6,010	3,075
Fuel oil	77,412	11,059	43,234	6,176	396,924	441,559
Diesel and gas oil	.....	.....	38,740	5,534	232,288	124,540
Gasoline	23,255	3,322	.....	.....	1,099,108	1,375,492
Kerosene	.....	.....	.....	.....	285,863	241,499

characteristic of the Sespe logged at 1,580 feet. The well continued to blow for several days flowing approximately 5,000 bbls. of salt water in addition to mud and a small quantity of gas. The General Petroleum's No. 10 Erburu is rotating ahead in a tough shale at 2,420 feet. This is the tenth well drilled on the Erburu lease by the General Petroleum since it discovered the field last year. In the Goleta area, the General Petroleum has temporarily suspended work on No. 3 More, a deep test at 5,183 feet, although an early resumption of work is anticipated. All three wells drilled on the More Ranch east of the Elwood Field in Santa Barbara County have shown exceptionally high gas pressures and may ultimately be converted into commercial gas producers.

Playa Del Rey

Three wells were put on production in the Playa Del Rey Field of Los Angeles Basin during the past seven-day period, two of which were finished in the deep Recreation zone. These were the Nile Oil Co.'s No. 1 Del Rey, completed at 5,737 feet, and No. 1 Stone of the Pacific Coast Properties, bottomed at 6,028 feet. The former, which was redrilled and deepened from the upper to the lower horizon, was good for 115 bbls. of exceptionally clean 24.8 gravity oil, while the latter came in producing 490 bbls. of 22.6 gravity oil under a pressure of 900 pounds. The Barnsdall, which is developing the Burks lease in conjunction with the Cypress Petroleum, successfully completed No. 7, a new well pumping 141 bbls. of 23.6 gravity oil from 3,845 feet, the hole having been completed with a 6⅝-inch liner carrying 425 feet of perforated. This well blew out several months ago during the course of work but was subsequently brought under control and drilling resumed. During the early part of the past week the Westport Petroleum Co.'s project, an outpost in the extreme eastern part of the Playa Del Rey Field, blew over the crownblock and continued flowing for a period of three hours. There was no oil in evidence, however, although considerable gas drilling mud and water was kicked out before the well sanded up. This is the second blowout which has occurred in this well and it is not at all improbable that the gas originated at the same point on both occasions. The most important drilling project under way in the Playa Del Rey Field at the present time is the Union Oil Co.'s No. 1 Vidor, located about midway between the Westport Petroleum Co.'s well and nearest production in the Playa Del Rey Field. The importance which attaches to No. 1 Vidor lies in the fact that it has looked exceptionally promising during the course of work and will extend the eastern limits of the Playa Del Rey Field approximately 3,500 feet. This well, located on an artificial island in the midst of a swampy terrain, will bear watching during the course of work as the outlook for production within the next 15 days is exceptionally promising. The Union has already started work on No. 3 Del Rey, located between No. 1 Vidor and present production, and the bit will be started downward within the next few days. The company's No. 8 Townsite proved a flivver in the deep Recreation zone and the Union is consequently drilling down into the schist in order to determine the possibility of securing production in the event of an accumulation of oil in a bed of fractured schist.

Long Beach

It has been several weeks since a substantial producer has been finished in the Long Beach Field of Los Angeles Basin but the M. & A. Oil Co.'s No. 3 Painted Hills proved an exception to the rule when it was completed during the early part of the past week. This new well, finished under the supervision of E. J. Miley, registered an initial daily production of 1,025 bbls. of clean 29.2 gravity oil and is maintaining a consistent flow. It was bottomed at 5,875 feet and finished with a 9-inch water string at 4,744 feet and a 6⅝-inch liner. The Painted Hills lease, located on the south flank of the Long Beach structure, has been quite productive, No. 2, completed a few months ago, being good for 595 bbls. per day. C. L. Anderson successfully recompleted No. 1 Drake doing 250 bbls. per day after cleaning out to bottom and adding a little additional footage. The Ring Petroleum also chalked up a recompletion this week by returning No. 6 Deeds in the Los Cerritos area to production pumping 125 bbls. per day.

In the Santa Fe Springs Field, the Union recompleted No. 37 Bell doing 125 bbls. of 34.9 gravity oil from the Meyer zone after plugging back from the Nordstrum zone at 5,848 feet. The Continental was still swabbing No. 24 Selover, a deep test in the Seal Beach Field at 9,054 feet and had not yet secured a commercial flow at a late hour. There was no change for the better as far as deep zone development in the Huntington Beach townlot area is concerned, although something of a more definite nature is expected in the near future. W. E. McCaslin's No. 17 Transport has been de-

(Continued on Page 120)

THREE DRY HOLES IN MT. PLEASANT; MUSKEGON WELLS HOLDING UP WELL

By Paul A. Elliott

MUSKEGON, Mich., May 9.—Three dry holes in the Mount Pleasant area were the only completions in Michigan this week. All three of the unsuccessful completions near Mount Pleasant were outside of the proved field on wildcat or semiwildcat locations.

The first Ogemaw County test drilled by the Sun Oil Co. on the Frank Bernard lease, E half, Section 16-22n-4e, Logan Township, about 50 miles northeast of the proved Mount Pleasant Field, was dry in the Monroe formation at a total depth of 3,025 feet.

The Michigan Gas & Oil Corp.'s No. 1 John Parker, C NW SE, Section 7-16n-3w, Wise Township, Isabella County, also was dry in the Dundee.

The Theodore Oil Co.'s No. 1 Cornelius L. Durkin well, SW SE SE, Section 5-14n-2w, Greendale Township, Midland County, had a show of gas and oil at 3,581-86 feet after topping the Dundee at 3,545 feet but was dry at a total depth of 3,610 feet.

The only application for a new permit was for the Gordon Oil Co.'s No. 2 Skinner, SE NE NE, Section 16-14n-2w, Greendale Township, an offset to the Kalamazoo-Hornick well which last week was completed as the largest new producer in Michigan in several months and the most important extension in a year.

The Muskegon Oil Corp.'s No. 1 Charles Reeths, NW NW, Section 9-10n-16w, Muskegon Township, the discovery well of the Muskegon Field, will be deepened from the upper Traverse to the Monroe formation.

Although eight Monroe gassers have been completed, none has been a large producer and operators are still hoping to strike the Monroe where it will be loose enough for large production of natural gas. Pay sands in present completed wells have been particularly tight, making large production almost impossible.

The only two drilling wells in the Muskegon Field are the Blue Arrow Petroleum Co.'s No. 1 Laman and the Ma-Ha-

(Continued on Page 127)

IMPORTANT NORTHERN CALIFORNIA WILDCATS

Company, well and location—	S.T.R.	Depth	Status
Western Gulf, No. 1 Santa Maria, Santa Barbara Co.	5- 9-35	6,400	sd. sh. drilling
Fields Gas Co., No. 1 Santa Maria, Santa Barbara Co.	8- 9-33	5,670	suspended
Barnsdall, No. 1 Gato Ridge, Santa Barbara Co.	9- 8-32	6,390	hd. sd. drilling
Midwest Oil Co., No. 1 Los Alamos, Santa Barbara Co.	2- 7-33	1,800	fishing
Smith, W. E., No. 1 Lompoc, Santa Barbara Co.	18- 7-34	100	tech. spud
General Pet., No. 1 Goleta, Santa Barbara Co.	21- 4-28	4,533	gas—shut in
General Pet., No. 2 Goleta, Santa Barbara Co.	21- 4-28	4,350	gas—shut in
General Pet., No. 3 Goleta, Santa Barbara Co.	21- 4-28	5,183	recemented
General Pet., No. 134 Goleta, Santa Barbara Co.	21- 4-28	1,496	validation
General Pet., No. 136 Goleta, Santa Barbara Co.	21- 4-28	2,047	suspended
General Pet., No. 137 Goleta, Santa Barbara Co.	21- 4-28	2,050	suspended
General Pet., No. 138 Goleta, Santa Barbara Co.	21- 4-28	4,931	suspended
General Pet., No. 139 Goleta, Santa Barbara Co.	21- 4-28	2,051	suspended
General Pet., No. 143 Goleta, Santa Barbara Co.	21- 4-28	1,040	suspended
Boles Oil Co., No. 140 Goleta, Santa Barbara Co.	22- 4-28	1,040	suspended
U. S. Pet., No. 141 Goleta, Santa Barbara Co.	20- 4-28	1,035	suspended
U. S. Pet., No. 142 Goleta, Santa Barbara Co.	20- 4-28	1,032	suspended
U. S. Pet., No. 143 Goleta, Santa Barbara Co.	20- 4-28	1,019	suspended
El Camino, No. 149 Goleta Tideland, Santa Barbara Co.	22- 4-28	1,035	suspended
South. Cal. Drlg. Co., No. 1 Goleta, Santa Barbara Co.	12- 4-29	1,890	sd. sh. drilling
Bolsa Chica, No. 191 Goleta, Santa Barbara Co.	24- 4-29	4,191	testing
Bellview Oil Co., No. 159 Goleta, Santa Barbara Co.	24- 4-29	2,099	suspended
Johnson, George, No. 1-A Goleta, Santa Barbara Co.	19- 4-27	2,840	Sespe form.
Cuyama Oil Corp., No. 1 Cuyama, Santa Barbara Co.	12-10-27	rig	suspended
Hart Pet. Co., No. 1 Cuyama, Santa Barbara Co.	27-10-26	rig	suspended
Sovereign Oil Co., No. 1 Santa Maria, Santa Barbara Co.	20-10-35	5,500	cleaning out
Pacific Western, No. 1 Gibraltar, Santa Barbara Co.	14- 5-27	2,345	suspended
Associated, No. 1 Rincon Creek, Ventura Co.	19- 4-24	2,080	suspended
C.C.M.O. Co., No. 2-A Rincon, Ventura Co.	23- 3-24	9,475	br. sh. drilling
Continental, No. 1 Rincon, Ventura Co.	23- 3-24	3,440	hd. sd. drilling
Pure Oil Co., No. 1 S. P. Canyon, Ventura Co.	15- 4-21	3,591	suspended
Superior Oil Co., No. 1 Sespe, Ventura Co.	14- 4-21	6,602	sd. sh. drilling
Merchants Pet., No. 1 Sespe, Ventura Co.	1- 4-20	1,225	sd. sh. drilling
Lockwood Valley Oil Co., well No. 1, Ventura Co.	32- 8-21	1,015	suspended
Magu Synd., No. 1 Oxnard, Ventura Co.	17- 1-21	3,350	hd. sd. drilling
Wilshire Oil Co., No. 1-A Buttonwillow, Kern Co.	7-29-24	7,000	recemented
Kent & McDonald, No. 1 Temblor Hills, Kern Co.	3-32-22	1,672	suspended
Federal Drlg. Co., No. 1 Buena Vista, Kern Co.	20-31-24	5,367	suspended
General Pet., No. 1 Belridge, Kern Co.	30-28-21	4,311	br. sh. drilling
The Texas Company, No. 1 Belridge, Kern Co.	22-27-20	5,045	suspended
Standard, No. 1 Belridge, Kern Co.	31-27-20	5,325	cleaning out
Ohio Oil Co., No. 1 Belridge, Kern Co.	36-27-20	5,980	recemented
Reward Oil Co., No. 1 Belridge, Kern Co.	34-27-20	5,000	cleaning out
Continental, No. 1 Belridge, Kern Co.	36-27-20	4,445	sd. sh. drilling
Wallace, K. C., No. 1 Belridge, Kern Co.	32-29-21	4,222	cleaning out
Rio Cal. Pet., No. 1 Shale, Kern Co.	2-27-18	2,355	redrilling
Wicker, Sy, No. 1 Arvin, Kern Co.	12-30-28	1,250	suspended
Shell, No. 1 Weed Patch, Kern Co.	29-30-29	8,450	cemented
Shell, No. 2 Weed Patch, Kern Co.	29-30-29	6,410	suspended
Shell, No. 3 Weed Patch, Kern Co.	32-30-29	5,401	sd. sh. drilling
Osborn, Colter, No. 1 Weed Patch, Kern Co.	15-30-29	2,500	sd. sh. drilling
Mohawk Oil Co., No. 1 Weed Patch, Kern Co.	32-30-29	6,150	salt water
Mohawk Oil Co., No. 2 Weed Patch, Kern Co.	4-31-29	rig	suspended
Alpine Oil Co., No. 1 Weed Patch, Kern Co.	13-31-29	3,735	cleaning out
Standard, No. 1 Devils Den, Kern Co.	14-25-18	3,313	hd. sd. drilling
Hannah, Tom, No. 1 Devils Den, Kern Co.	25-25-18	2,925	cemented
Cumberland Oil Co., No. 1 Devils Den, Kern Co.	21-26-18	1,590	suspended
Langstroth, F. B., No. 1 Blackwell Corner, Kern Co.	14-26-19	rig	suspended
E. J. Miley, No. 1 Blackwell Corner, Kern Co.	17-26-19	rig	suspended
Shell, No. 1 Semitropic, Kern Co.	17-27-23	9,700	plug 6,915 ft.
Moran & DeCamp, No. 1 Mojave, Kern Co.	26-10-14	750	suspended
Kendall Dev. Co., No. 1 Mojave, Kern Co.	27-11- 9	496	sd. sh. drilling
Meridan Oil Co., No. 1 Antelope, Kern Co.	11- 9-15	3,804	suspended
Ritchie, J. J., No. 1 Tejon, Kern Co.	33-11-19	5,530	suspended
Associated, No. 1 Jacalitos, Fresno Co.	22-21-15	4,503	plug 3,685 ft.
Carruthers Oil Co., No. 1, Fresno Co.	4-17-20	rig	suspended
Miracle Oil Co., No. 1 Cuyama, San Luis Obispo Co.	17-10-25	314	suspended
Panorama Oil Co., No. 1 Carizzo, San Luis Obispo Co.	7-31-21	4,019	redrilling
Tray El Oil Co., No. 1 Carizzo, San Luis Obispo Co.	7-32-22	1,437	cleaning out
Cities Service, No. 1 Creston, San Luis Obispo Co.	20-28-15	....	material
Latin Amer. Pet., No. 1 Shandon, San Luis Obispo Co.	21-27-15	4,615	cleaning out
Schilling, C., No. 1 Atascadero, San Luis Obispo Co.	24-28-12	1,000	sd. sh. drilling
Martin, J. D., No. 1 Edna, San Luis Obispo Co.	5-31-13	3,010	suspended
Schockley, C., No. 1 Pismo, San Luis Obispo Co.	13-32-13	3,094	suspended
Pacific Inland, well No. 1, Monterey Co.	19-23-15	1,160	suspended
Brown, F. A., No. 1 Parkfield, Monterey Co.	15-23-14	816	suspended
Irma Investment Co., No. 1 Dudley Ridge, Kings Co.	7-23-20	1,345	cemented
O'Donnell, J. E., No. 1 Dudley Ridge, Kings Co.	7-23-20	1,635	gas well—idle
Valley Expl. Co., No. 1 Dudley Ridge, Kings Co.	20-23-20	3,750	cleaning out
Kettleman Lakeview, No. 1 Tulare Lake, Kings Co.	11-23-19	1,304	suspended
Purman, T. H., No. 1 Reef Ridge, Kings Co.	35-23-17	3,595	br. sh. drilling
Seymour, L. W., No. 1 Avenal, Kings Co.	10-22-16	1,148	suspended
Utah Dev. Co., No. 1 Pyramid Hills, Kings Co.	13-24-18	....	material
Twin State Oil Co., No. 1 Point Arena, Mendocino Co.	14-12-17	6,605	sd. sh. drilling
Orinda Pet., well No. 1, Contra Costa Co.	32- 1- 3	2,012	hd. sd. drilling
Pettingall, C. E., No. 1 Porterville, Tulare Co.	15-22-27	912	hd. sd. drilling
Knapp, George, No. 1 Porterville, Tulare Co.	20-22-27	620	sd. sh. drilling
Inland Valley Oil Co., No. 1 Visalia, Tulare Co.	24-17-24	2,092	suspended
Larson, S. E., No. 1 Tulare Lake, Tulare Co.	20-24-23	498	redrilling
Colusa Oil Co., No. 1 Bush, Colusa Co.	31-15- 4	910	hd. sd. drilling
Oakdale Oil Co., No. 1 Oakdale, Stanislaus Co.	3- 2-10	4,117	hd. sd. drilling
Orland Oil Synd., No. 1 Orland, Tehama Co.	31-23- 3	2,520	sd. sh. drilling
Sargent Oil Co., No. 1 Sargent, Santa Clara Co.	1-12- 3	rig	suspended

IMPORTANT SOUTHERN CALIFORNIA WILDCATS

Company, well and location—	S.T.R.	Depth	Status
Olympic Realty Corp., No. 1 Barnes, Los Angeles Co.	14- 2-15	5,050	hd. sd. drilling
Kines Pet., No. 1 Ocean Park, Los Angeles Co.	9- 3-15	5,096	br. sh. drilling
Taylor Oil Co., No. 1 Culver, Los Angeles Co.	13- 2-15	6,238	suspended
Mesmer City Corp., No. 1 Mesmer, Los Angeles Co.	24- 2-16	5,200	sd. sh. drilling
Dwyer & Becker, No. 1 Compton, Los Angeles Co.	17- 3-13	4,520	suspended
Allison Synd., No. 1 Baldwin, Los Angeles Co.	8- 2-14	5,110	suspended
Cal. Ventura Oil Co., No. 1 Manhattan, Los Angeles Co.	30- 3-14	6,525	suspended
Cal. Ventura Oil Co., No. 1 Hermosa, Los Angeles Co.	31- 3-14	3,396	suspended
Cal. Ventura Oil Co., No. 2 Hermosa, Los Angeles Co.	31- 3-14	3,300	suspended
Cal. Oilfields Corp., No. 1 Hermosa, Los Angeles Co.	31- 3-14	2,560	suspended
Carniel Oil Corp., No. 1 Hermosa, Los Angeles Co.	31- 3-14	3,214	cleaning out
Hermosa Expl. Co., No. 1 Hermosa, Los Angeles Co.	31- 3-14	2,800	cleaning out
Kellogg, W. R., No. 1 Hermosa, Los Angeles Co.	6- 4-14	1,594	sd. sh. drilling
Westwood Pet., No. 1 Hermosa, Los Angeles Co.	6- 4-14	3,200	sd. sh. drilling
Tulsa Oil Co., No. 1 Hermosa, Los Angeles Co.	6- 4-14	3,060	sd. sh. drilling
McMahon & McDonald, No. 1 Watts, Los Angeles Co.	12- 3-14	4,665	suspended
Staple Oil Co., No. 1 Manhattan, Los Angeles Co.	24- 3-15	789	suspended
Shelley, C. M., No. 1 Torrance, Los Angeles Co.	12- 4-14	rig	suspended
Ewert, W. S., No. 1 Watson, Los Angeles Co.	20- 4-13	....	location
York & Smullin, No. 1 Watson, Los Angeles Co.	29- 4-13	3,698	75 bbls.
Wilmington Consd., No. 1 Watson, Los Angeles Co.	17- 4-13	1,012	sd. sh. drilling
Mack Oil Co., No. 1 Chatsworth, Los Angeles Co.	6- 2-16	rig	suspended
Brubaker, W. O., No. 1 Van Nuys, Los Angeles Co.	1- 2-15	2,700	suspended
Racker & Croul, No. 2 Puente, Los Angeles Co.	27- 2-10	2,200	sd. sh. drilling
Arden Oil Co., No. 1 Puente, Los Angeles Co.	15- 2-10	3,325	suspended
D. & B. Oil Co., No. 1 Puente, Los Angeles Co.	3- 2-10	4,620	suspended
El Dorado Oil Co., No. 1 Puente, Los Angeles Co.	30- 2- 9	1,092	suspended
Marcel Pet. Co., No. 1 Puente, Los Angeles Co.	31- 2- 8	3,100	suspended
Cudahy Oil Co., No. 1 Bell, Los Angeles Co.	30- 2-12	1,370	recemented
The Texas Company, No. 1 Montebello, Los Angeles Co.	4- 2-12	3,400	hd. sd. drilling
Huntington Cent. Oil Co., No. 1 Montebello, Los Angeles	34- 1-11	mtl.	building rig
Colito Oil Co., No. 1 Monterey Park, Los Angeles Co.	28- 1-12	5,278	suspended
Hammer, Fred, No. 1 Alhambra, Los Angeles Co.	24- 1-13	3,412	suspended
Los Gatos Oil Co., No. 1 El Monte, Los Angeles Co.	16- 1-11	3,280	suspended
Rucker, L. W., No. 1 Calabasas, Los Angeles Co.	26- 1-17	753	sd. sh. drilling
Ness Pet., No. 1 Newport, Orange Co.	21- 6-10	4,910	suspended
Hall, H. L., No. 1 Newport, Orange Co.	20- 6-10	790	suspended
Gesell, T. F., No. 1 Newport, Orange Co.	29- 6-10	1,470	cleaning out
Standard, No. 1 Newport, Orange Co.	26- 6-10	4,560	hd. sd. drilling
Western Gulf, No. 1 Santa Ana, Orange Co.	12- 3- 8	3,267	suspended
The Texas Company, No. 1 Olive, Orange Co.	7- 4- 9	5,206	sd. sh. drilling
Cohen, H., No. 1 Sunset Beach, Orange Co.	20- 5-11	....	location
Gieck Oil Co., No. 1 Sunset Beach, Orange Co.	20- 5-11	2,052	sd. sh. drilling
Beck, F. A., No. 1 Corona, Riverside Co.	8- 4- 6	475	sd. sh. drilling
Beck, F. A., No. 1 Beaumont, Riverside Co.	1- 3- 1	512	sd. sh. drilling
Borderland Oil Co., No. 1 Encinitas, San Diego Co.	12-13- 4	2,519	suspended
Borderland Oil Co., No. 1 Point Loma, San Diego Co.	30-16- 3	4,890	hd. sd. drilling
South Bay Oil Co., No. 1 Border, San Diego Co.	21-18- 2	....	location
Carr, O. K., No. 1 Capistrano, San Diego Co.	18- 8- 8	5,250	cleaning out
Grey, H. H., No. 1 Redlands, San Bernardino Co.	25- 1- 2	2,392	suspended

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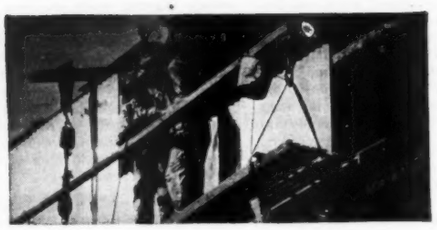

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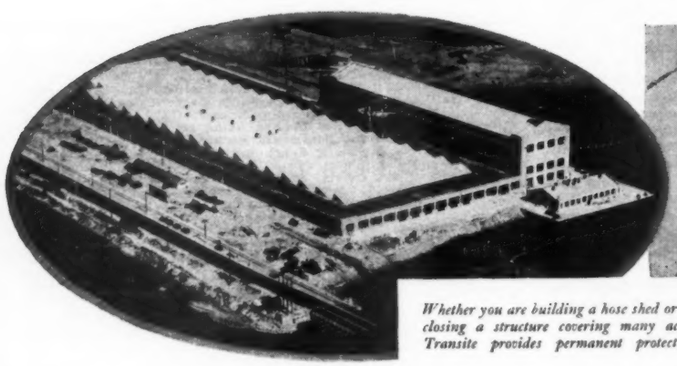

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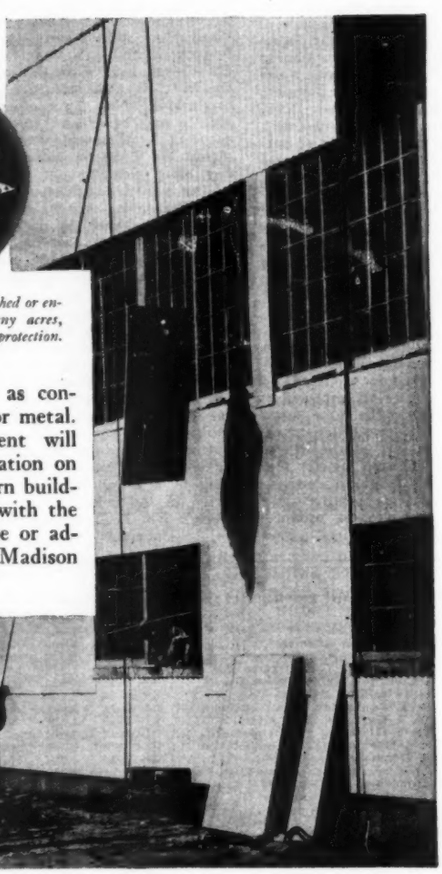

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FLAT OR CORRUGATED

Hobbs District Allowable Is Increased

Tests in Caprock Area, Lea County, and Valencia County Abandoned. Wyoming Wildcats Resuming. Deep Test Planned in Arizona

By Tolbert R. Ingram
Staff Correspondent, Rocky Mountain Area

DENVER, Colo., May 11.—The allowable outlet for the Hobbs Pool was increased to 37,040 bbls. daily for the first half of May from 32,506 bbls. daily for the last half of April. The Continental Oil Co. is taking about 200 bbls. additional daily from the Artesia and Caprock areas. The Western Drilling Co.'s No. 1 Bridges, in the Caprock area, Lea County, and Thomas B. Harlan's No. 3 Harlan in Valencia County, were abandoned.

In Colorado, the A. R. Jones Oil & Operating Co.'s test in Baca County, west of the Hugoton, Kans., field was abandoned at 4,965 feet. Three new wildcats are almost ready to begin spudding.

Two new locations were reported in the Kevin-Sunburst Field in Montana.

The Midwest Refining Co.'s Midway Dome test in Wyoming is nearing the objective Sundance sand after passing through a dry sand in the Morrison. Several Wyoming wildcats are resuming after being shut down for the winter. The Mountain Fuel Supply Co.'s No. 1 Capper on the North Baxter Basin structure showed 3 bbls. per day of very high grade oil in the Sundance and will be shot. One small well was completed in the Osage Fied.

The Benedum-Trees interests are preparing to drill a deep test in Arizona.

NEW MEXICO

Eddy County

The Continental Oil Co.'s refinery at Artesia increased its crude runs in April from an average of 800 to 1,000 bbls. daily. This about takes care of the Artesia production and permits the drawing of some oil from the Caprock area. It is likely another increase will take place about May 15. The Ohio Oil Co. retired as a purchaser of Artesia crude some time ago and the Illinois Pipe Line Co. turned back to the New Mexico Pipe Line Co. its leased line.

The only well showing any activity recently in Eddy County is Oil Well Drilling Co.'s No. 1 Baker, SE NE NE, Section 21-21-26, in the Carlsbad district, which is shut down at 885 feet for casing to shut off sulphur water at 690-700 feet.

Lea County

The pipe line companies serving the Hobbs Field increased their nominations for crude by 4,534 bbls. daily for the first half of May. This raises the allowable outlet to 37,040 bbls. daily, the largest since proration went into effect on July 10, 1930. The potential production of the field, as of May 1, was placed at 1,148,920 bbls., only a slight variation from the figures for the past two months. The number of wells was 143, an increase of one, and the number of units in production was 126, the same as in the last period.

Most of the drilling wells in Lea County are temporarily idle. One well was reported abandoned in the Western Drilling Co.'s No. 1 Bridges, SE cor. NW, Section 17-17-34, in the Caprock area. It was drilled to a total depth of 5,083 feet after passing through a sulphur water horizon at 5,040-45 feet, and was plugged back and shot with 200 quarts at 4,680-4,750 feet. It was given a swabbing test and averaged around 25 bbls. a day. Culberson & Conrad's No. 1 State, C NE, Section 22-18-34, in this same area, is rigging up rotary.

In the Hobbs area, Midwest Refining Co.'s No. 26 Capps, C SE SW, Section 3-19-38, is drilling at 2 850 feet in brown lime. National Securities Oil Co.'s No. 1 Linam, NE SE SW, Section 33-18-37, to the west of the Hobbs Pool, is shut down for orders after plugging back from 4,272 feet to 4,188 feet. Western Drilling Co.'s No. 1 State, C SW NE, Section 15-18-37, is shut down for orders after rigging up and drilling water well.

Western Drilling Co.'s No. 1 State, NE cor. SE, Section 13-17-36, Lovington area, is shut down for orders at 1,887 feet. Same company's No. 1 State, SE NE NE, Section 16-20-32, northwest of the Lea Pool, is shut down for orders at 955 feet.

Leonard & Levers' No. 1 Justis, C SE NE, Section 19-25-37, in the Jal area, is bottomed at 2,025 feet in salt and fishing for tools.

Otero County

Pasotero Petroleum Corp.'s No. 1 Evans, 330 feet from the west line and 2,270 feet from the south line in the SW, Section 22-24-12, is a location, to be a test of the Pennsylvanian formation on the Pasotero structure, 61 miles northeast of El Paso. The block of 21,000 acres was assembled by M. W. Evans, of Artesia, and the geological work was done by W. H. Cheney, of Artesia, whose report sets forth that the structure has a traverse of more than 12 miles and a complete closure of 85 feet. The company is incorporated in New Mexico and the officers are S. Seeberg, Ray W. Stevens and L. M. Dorn, of Los Angeles. Offices have been established in El Paso.

Chaves County

R. T. Neal and others' No. 1 Russell, SW NW NW, Section 21-14-25, Hagerman district, is shut down for orders at 2,320 feet in lime and shale, and Warman Oil Trust's No. 1 Seibert, NE, Section 27-13-24, Blackdom district, is shut down for fuel at 2,650 feet.

De Baca County

Matador Oil Co.'s No. 1 Wood, NE SW SW, Section 6-4n-20, Salada Creek, is moving in pipe preliminary to resuming at 3,001 feet.

Mora County

Fulton Petroleum Co.'s No. 1 Santa Fe-Dioice Co., NE cor., Section 14-19-21, Wagonmound district, is drilling at 850 feet in shale.

Guadalupe County

Los Angeles-Hollywood Oil Syndicate's No. 1 McMullen, SW cor., Section 24-5n-16, Alamagordo Creek, which spudded in 1929 and drilled to 220 feet, is preparing to resume. The syndicate has incorporated the New Mexico Producing & Refining Co., Ltd., to take over the operation. Part of the equipment was taken from the McNabb well drilled nearby several years ago.

San Juan County

R. C. Oswell's No. 2, NW, Section 34-30-11w, between Aztec and Bloomfield, is spudding. This is on a government permit of 1,667 acres and the well is 200 feet south of No. 1 which was drilled several years ago and had a show of oil at 1,323-65 feet, but was abandoned after failure to make a water shutoff. The well had been standing for three years. No. 2 is a little higher on structure and the objective is expected at around 1,750 feet. Continental Oil Co.'s No. 24, SW cor. NW, Section 1-29-19, Rattlesnake Dome, is bottomed at 4,730 feet and is sidetracking at 3,894 feet in sand and shale.

McKinley County

S. Dysart and others' No. 1 Bouten, NW NE, Section 14-14-10, Ambrosia Lake district, is bottomed at 1,285 feet (corrected) and is straightreaming to lower and set 8¼-inch.

Valencia County

Thomas B. Harlan and others' No. 3 Harlan Ranch, NW cor., Section 5-6n-2e, De Chavez district, is reported abandoned at 6,900 feet, total depth. This was the third hole, the other two being lost at around 4,200 feet. It tested the Pennsylvanian formation and had several shows of oil and gas, but none in commercial quantities.

Pipe Line Runs in April

Following are the pipe line runs from the producing wells in the Hobbs Field of the companies named during the month of April:

Company—	Month (bbls.)	Dly. av (bbls.)
Amerada Petroleum Co.	105,789	3,526
Atlantic Oil Prod. Co.	8,786	293
Continental Oil Co.	69,238	2,308
Empire Gas & Fuel Co.	44,791	1,493
Getty Oil Co.	34,590	1,153
Gypsy Oil Co.	71,955	2,399
Humble Oil & Refining Co.	109,080	3,636
Landreth Prod. Co.	16,422	547
Mid-Continent Pet. Corp.	3,431	114
Mid-West Refining Corp.	118,268	3,942
Ohio Oil Co.	62,822	2,094
Prairie Oil & Gas Co.	14,128	471
Shell Petroleum Corp.	128,401	4,280
Skelly Oil Co.	12,526	418
Sun Oil Co.	39,704	1,323
The California Co.	21,381	713
The Texas Company	48,971	1,632
Texas Pacific C. & O. Co.	12,570	419
Tidal Oil Co.	48,504	1,617
Vacuum Oil Co.	3,391	113
Walker Oil Corp.	2,346	78
Total	977,094	32,570

Total pipe line runs from the Hobbs Field since proration has been in effect have been 9,471,059 bbls. or 3,751 bbls. less than the allowable production during the period.

Potential and Actual

The Hobbs executive committee has published the estimated daily potential production of the wells in the Hobbs Pool together with the allowable production for the first half of May. By companies the estimates follow:

Company—	No. of wells	Rated potential daily prod. (bbls.)	Allowable daily prod. (bbls.)
Amerada Petroleum Co.	11	135,270	4,065
Atlantic Oil Prod. Co.	2	7,740	232
Continental Oil Co.	7	89,459	2,668
Empire Gas & Fuel Co.	6	52,300	1,700
Getty Oil Co.	3	45,525	1,316
Gypsy Oil Co.	8	90,198	2 687
Humble Oil & Ref. Co.	12	135,614	4,074
Landreth Prod. Co.	3	15,414	618
Mid-Continent Pet. Corp.	1	2,325	129
Mid-West Refining Co.	26	118,408	4,547
Ohio Oil Co.	10	74,738	2,406
Prairie Oil & Gas Co.	4	13,219	538
Shell Petroleum Corp.	19	148,310	4,813
Skelly Oil Co.	2	13,700	476
Sun Oil Co.	4	50,625	1,513
The California Co.	5	24,331	806
The Texas Company	7	54,133	1,816
Texas Pacific C. & O. Co.	2	13,600	474
Tidal Oil Co.	8	61,043	1,827
Vacuum Oil Co.	1	2,300	182
Walker Oil Corp.	1	668	91
Total	143	1,148,920	37,040

COLORADO

Weld County

Reiter-Foster Oil Co.'s No. 1 Ida Johnson, C NE NW, Section 24-6n-61, Greasewood Dome, the first operation started on that structure since the discovery well came in seven months ago, has completed rig and is connecting boilers and rigging up. Manning & Terry, Inc., have the contract. This is a rotary operation, the contract calling for a minimum depth of 7,250 feet. It is a joint operation with the Platte Valley Petroleum Co.

Morgan County

Indian Territory Illuminating Oil Co.'s No. 1 State, C NE NE, Section 16-1n-57, Fort Morgan anticline, is shut down at 4,090 feet. It has been at this depth since early in February trying to land 6⅝-inch on bottom, but without success.

The 8¼-inch froze at 3,670 feet and the application of as high as 1,800 pounds pressure failed to establish circulation. It probably has 1,500 feet to go to reach the first objective, the Muddy sand in the Dakota series.

While leasing in Morgan and other

(Continued on Page 138)

ORISKANY SAND GASSERS INCREASE NORTH AND SOUTH OF STATE LINE

By Special Correspondent

CORNING, N. Y., May 9.—A 25,000,000-foot gas well in Tioga County, Pennsylvania, and a number of good gassers in the Schuyler and Yates County gas fields on the New York side of the line featured the past week in review.

Lycoming Gas Co.'s first producer in the Tioga gas field, which was reported last week as having a good showing in the top of the Oriskany sand, was later drilled in to 25,000,000-foot production at a total depth given as 3,808 feet. The well is No. 1 Boom in Lawrence Township. The gas pay in this well is about 200 feet higher than the pay in the field's biggest well, on the Meaker farm in the same district.

Benedum & Trees' No. 2 Lawrence, in Lawrence Township, was drilling below 3,400 feet and should be the next well to hit the gas horizon. The Lycoming Gas Co.'s No. 1 Shoemaker in Lawrence Township is drilling below 5,725 feet. Same company's No. 1 Hoyt in Lawrence Township is drilling at 3,210 feet.

Penn-Ohio Gas Co.'s No. 2-W E. W. Close in Farmington Township was drilling at 3,125 feet.

Penn-United Gas Co.'s No. 1 Burdett, Lawrence Township, was drilling at 3,050 feet.

All the other operations on the Pennsylvania side of the line were reported at various stages all the way from a rig up to drilling at 2,500 feet.

In New York Counties

On the New York State side Benedum & Trees' No. 1 Murphy, in Elmira Township, Chemung County, was dry in sand at 3,175 feet but had a showing of gas at 3,225 feet. The same operators' No. 1 Hagar in Schuyler County had a fishing job for lost pipe at 5,375 feet. Frank Calkins and others' No. 1 Ernest, in Tyrone Township, Schuyler County, was a 3,000,000-foot gasser at 1,723 feet. DeGolier and others have an 8,000,000-foot gasser in their No. 1 Wyss in Tyrone Township. Disbrow and others drilled into salt water at 2,114 feet in No. 1 Disbrow in Tyrone Township.

J. T. Cunningham's No. 1 Swarthout, in the Wayne-Schuyler County gas area, came in with an initial production of 5,000,000 feet. This well was drilled with a portable drilling machine and the pay was found at approximately 1,700 feet.

The International Salt Co. completed a 3,500,000-foot well in No. 1 Allen in the Dundee Field in Yates County.

The Bigelow Gas Corp. has been given a charter by the State. It will operate in this field. George R. Mills of Sodus, president of the Lamoka Power Co., heads the new company.

Corning gas consumers are enjoying the newest supply from the Tioga gas fields, the latest producer, the No. 2 Palmer, 200 yards from No. 1 Palmer, good for approximately 25,000,000 feet per day, being turned immediately into the supply lines of the Allegany Gas Co..

(Continued on Page 140)

EAST TEXAS development has shifted oil's geographical center to DALLAS ◆◆◆

ONE of the country's foremost petroleum economists decided that the development of the East Texas fields had changed the geographical center of the Nation's oil industry. He plotted the major producing and refining areas on his map and, working from these, by mathematical calculations, established the exact geographical center of the oil industry. *It is just a few miles east of the city limits of Dallas!*

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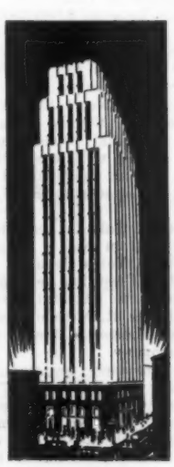

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Activity in Ward and Loving Counties

Grand Falls, Shipley-Bennett and Wheat Pools Lead in Field Work in West Texas. Central and Panhandle Fields Quiet

By L. E. Bredberg
Fort Worth Bureau, The Oil and Gas Journal

FORT WORTH, Tex., May 11.—Ward and Loving Counties continue to be the most active counties in the West Texas district, the Grand Falls and Shipley-Bennett Pools, especially the former shallow one, seeing the majority of tests in Ward County, while the Wheat Pool in Loving County is in its most active stage since discovery, and is one pool in the district not under proration, producing high gravity sweet oil, with practically all of it going to refineries, especially the Rio Grande Oil Co.'s refinery in El Paso and the Paso-Tex refinery in the same city.

Lewis and Slagel's No. 1 Cartwright and others in the northwestern part of the county, located in Section 1, Block 57, Township 1, T.&P. Survey, is promising the opening of another Delaware Pool in the county, as it is swabbing 25 bbls. of pipe line oil daily after shutting off bottom hole water, plugging back 5 feet from 3,179 to 3,174 feet to accomplish this purpose. It is approximately one-half mile from the New Mexico line and over a mile northwest of a dry hole which was drilled some time ago by the Rio Grande Oil Co. in Section 12. This test was abandoned at a total depth of 3,508 feet, and if another pool is to be opened by the Cartwright (Henderson) test it will have to run to the north, as it is already defined to the south by Rio Grande's "duster."

Cranfill Brothers and Gulf Production Co. are plugging back their No. 1 Tubb in Section 8, Block B-27, western Crane County, in an effort to shut off water and produce it from above pay found at 4,301 feet last October. Total depth of the hole was 5,336 feet ard it will probably be plugged back to 4,505 feet and shot. Gravity of the oil was better than 39 degrees, the highest gravity oil yet produced in Crane County, which has production 18 miles to the east in the Church-Fields and McElroy Pools, and to the southeast in the Independent-Taylor Pool north of the town of McCamey, and an extension of the McCamey Pool, Upton County.

Producers Lay Pipe Line

The shallow producing Pecos Valley Pool, 18 miles northeast of Fort Stockton in Pecos County, will soon have an outlet to the north on the T.&P. Railroad by aid of a combination 4, 3 and 2-inch line which will be constructed by the producers in the pool to connect with the Wickett Refining Co.'s 4-inch line which transports oil from the Grand Falls Pool in southern Ward County to that company's refinery at Wickett. A 2-inch line from the pool to a point on the Santa Fe railroad 10 miles to the south, has served the field heretofore, the oil being shipped out by tank car to the San Angelo Refining Co.'s plant at San Angelo, but since that company discontinued purchasing Pecos Valley crude another outlet had to be obtained, and this new outlet is the result of co-operation of the producers in the pool with the Wickett Refining Co., which will process the crude in its plant at Wickett and also ship out oil from its loading rack at that place.

Another well was added to the small group of producers in the area between the Shipley and Bennett Pools, Ward County, this week when Clyde Bradford's No. 1 Hardage & Wilson headed about 10 bbls. per hour when drilled to a total depth of 2,461 feet, gas and oil coming from pay picked up at 2,445-52 feet, with an increase in oil at 2,452 feet. This makes the fifth well for this area which was formerly opened several months ago by the Texas Pacific Coal & Oil Co.'s No. 1 Barker, in Section 27, Block B-29, and extends production about 1½ miles to the north in Section 11 where the last well is located 330 feet from the southeast and southwest lines of the section.

The allowable production of the Crane-Upton areas was 560,730 bbls. for April, showing a field shortage for the month of 1,761 bbls., the total amount of oil produced for the month amounting to only 558,969 bbls.

Dry Hole in Winkler County

Magnolia Petroleum Co.'s No. 1 Bashara, in Section 17, Block B-3, 4 miles east of the Hendricks Pool, Winkler County, and an offset to a small producer in the same section, has been abandoned as dry at a total depth of 3,481 feet.

Activities in the Panhandle, Wichita Falls and Ranger districts have simmered down to routine drilling of a few wells, with only two or three locations staked in the former district, and with but few completions in all of them, there being at the present time no especially interesting tests or any making any showings of much interest.

Refinery at Olney

The Norgold Refining Co. contemplates completing its 800-bbl. topping plant at Olney in Young County within the next 30 days, to process crude from leases in the vicinity of Olney. Norman Goldsmith, principal owner of the plant, and citizen of Olney, is constructing the refinery to give some relief to some of the Young County wells.

WEST TEXAS PRODUCTION
Week ending May 11

County—	Wells	Bbls.
Andrews	3	.....
Crane	377	18,808
Crockett	51	1,616
Ector	78	6,024
Fisher	10	700
Garza	..	19
Howard-Glasscock	539	30,219
Irion	9	65
Jones	79	1,300
Loving	39	3,288
Mitchell	111	1,971
Pecos	544	74,812
Reagan	255	19,787
Runnels	5	85
Scurry	5	.....
Upton	259	5,203
Taylor	3	82
Ward	57	3,645
Winkler	595	44,330
Total production this week		211,954
Total production last week		210,504
Increase		1,450

COMPLETIONS IN PANHANDLE DISTRICT

Gray County

Danciger Oil & Refining Co.'s No. 2 Black, recompleted, old total depth 2,845 feet, initial production 4,500 bbls., deepened to 2,946 feet, no increase. Mazada Oil Co. and Shell Petroleum Corp.'s No. 1 Combs-Worley, recompleted, old total depth 2,958 feet, initial production 2,470 bbls. with 14,000,000 feet of gas, deepened to 3,045 feet, increased from 270 bbls. to 1,700 bbls. Sun Oil Co.'s No. 2 Combs, recompleted, old total depth 2,935 feet, initial production 429 bbls. New total depth 3,047 feet, new pay 3,030-47 feet, increased from 120 bbls. to 600 bbls. The Texas Company's No. 2 Bull, old total depth 2,816 feet, initial production 920 bbls., deepened to 2,999 feet, salt water.

Hutchinson County

Liner Drilling Co.'s No. 2 Johnson, first gas 2,280-2,305 feet, increase in gas 2,330 feet and 2,375 feet, initial production 42,600,000 feet of gas, total depth 3,012 feet.

RUNS THROUGH TRUNK LINES

Company, size and location—	Bbls.
Atlantic, 10-inch, Houston	13,670
Gulf, 10-inch, Ranger	12,132
Humble, 2-8-inch, San Angelo	21,304
Humble, 10-12-inch, Comyn	24,453
Illinois, 2-8-inch, Del Rio	26,458
Magnolia, 8-inch, De Leon	25,643
Pasotex, 8-inch, El Paso	12,426
Shell, 10-inch, Healdton	27,849
Shell, 10-inch, Houston	25,914
Texas, 12-inch, Houston	32,148
Total	211,977

RUNS TO WEST TEXAS REFINERIES

Big Spring Ref. Co., Big Spring	1,255
Burford Ref. Co., Pecos	4,383
Cosden Ref. Co., Big Spring	7,742
Col-Tex Ref. Co., Colorado	7,525
Humble Oil & Ref. Co., McCamey	3,728
Great Western Ref. Co., Big Spring	2,151
Wickett Ref. Co., Wickett	418
Total	27,202

TANK CAR SHIPMENTS

Big Lake from Texon	3,000
Fox and Thorsen from Mertzon	64
Southern C. O. P. Co. from Wickett	145
Total	3,209
Total daily average production	250,518
Total daily average distribution	242,388
Daily average to storage	8,130

COMPLETIONS IN WEST TEXAS

Jones County

Shaheel and Duffey's No. 1 Chittum, dry and abandoned, total depth 2,110 feet.

Andrews County

Deep Rock Oil Co. and others' No. 1 King, temporarily abandoned, total depth

(Continued on Page 108)

WILDCAT OPERATIONS IN TEXAS PANHANDLE

Week Ending May 11

CARSON COUNTY

Company, well, farm name, section and block—	Remarks:
Deep Lake Oil Co.'s No. 1 Keys, NE cor. SW, Sec. 1, Blk. 4, I.&G.N. Sur.	Drlg. 825 ft; carrying 10-in. csg.
El Paso-Amarillo O. & G. Co.'s No. 1 Champan, 594 ft. S, 1,458 ft. E, Sec. 7, Blk. 3, A.B.&M. Sur.	Rig.
Interstate Prod. Co.'s No. 1 Coffee, C S½ NW, Sec. 15, Blk. 4, I.&G.N. Sur.	Drlg. 2,760 ft; estimated 13,000.-000 ft. gas 2,755 ft.
North American O. & G. Co.'s No. 1 Burnett, 1,341 ft. S, 662 ft. E, of S E½, Sec. 80, Blk. 4, I.&G.N. Sur.	Drlg. plug.
Red River Gas Co.'s No. 1-A Bennett, 660 ft. N, 660 ft. W, NW, Sec. 2, Blk. 5, B.&B. Sur.	Rig.
The Texas Co.'s No. 1 Schaffer, C SW, Sec. 68, Blk. 4, I.&G.N. Sur.	Drlg. 2,510 ft.
The Texas Co.'s No. 1 Bednarz, 517 ft. S, 172 ft. W, S 100 ac. of SW, Sec. 2, Blk. 4, I.&G.N. Sur.	Standardizing 2,250 ft.

CHILDRESS COUNTY

C. L. Sloan et al's No. 1 B. P. Smith, Sec. 49, F. P. Knott lands	T.D. 5,000 ft.

COLLINGSWORTH COUNTY

Dixon et al's No. 1 Bell, 330 ft. N, 1,320 ft. W, Sec. 102, Blk. 21, H.&G.N. Sur.	Fishing bit 1,992 ft.

COTTLE COUNTY

Darby Oil Co. and Merry Bros. & Perrin's No. 1 Richards, 330 ft. NE, Sec. 13, B.S.&F. Sur.	S.D. 3,940 ft.

GRAY COUNTY

Anderson et al's No. 2 Vollmert, 330 ft. N and W, SW, Sec. 140, Blk. 3, I.&G.N. Sur.	Rig.
Boyles et al's No. 1 Colebank-Morse, 330 ft. NE, Sec. 65, Blk. 25, H.&G.N. Sur.	Spudded and S.D.
Brown et al's No. 1 Duncan, 330 ft. S and E, NW, Sec. 93, Blk. 3, I.&G.N. Sur.	S.D. 740 ft.
Cree Hoover & Traham's No. 1 Delmar, 330 ft. S line, 330 ft. W line, NW, Sec. 105, Blk. 3, I.&G.N. Sur.	Spudded.
Danciger O. & R. Co.'s No. 1 Barrett, NW cor. S½ NE. Sec. 128, Blk. 3, I.&G.N. Sur.	S.D. 3,180 ft.
Danciger O. & R. Co.'s No. 1-B Barrett, SW cor. N½ NE, Sec. 128, Blk. 3, I.&G.N. Sur.	S.D. 2,980 ft.
Danciger O. & R. Co.'s No. 1 Barnett, 231 ft. S, 330 ft. W, E½ of N 56 ac., Sec. 136, Blk. 3, I.&G.N. Sur.	5,000,000 ft. gas 3,097 ft; S.D. 3.-180 ft.

(Continued on Page 111)

WILDCAT OPERATIONS IN WEST TEXAS

Week Ended May 11

ANDREWS COUNTY

Company, well, farm name, section and block—	Remarks—
Deep Rock Oil Co. et al's No. 1 Kuykendall, 2,310 ft. from N and E of SW cor. Sec. 24, School Blk. A-46.	Cleaning out; total depth 4,648 ft.

BORDEN COUNTY

George Goodrum's No. 2 Conrad, 1,450 ft. from N and 2,500 ft. from E lines, Sec. 55, Blk. 25, H.&T.C. Sur.	Shut down 780 ft.

BREWSTER COUNTY

Brewster Oil Co.'s No. 1 fee, 2,640 ft. S and 2,598 ft. E of NW cor. Sec. 45, Blk. G-15, G.C.&S.F. Sur.	Shut down 1,935 ft.
E. L. Chapman's No. 1 Skinner, C SW SE Sec. 100, Blk. 2, G.C.&S.F. Sur.	Shut down 1,302 ft.
Trans-Pecos Oil & Gas Co.'s No. 1 Jones, 920 ft. from N and 2,500 ft. from E of Sec. 18, Blk. G-15, G.C.& S.F. Sur.	Shut down 2,820 ft.; set 6⅝-in. casing 2,775 ft.
Van McPhail's No. 1 McIntyre, SE cor. Sec. 59, Blk. 352, 7 miles S of Alpine	Shut down 1,750 ft.

COKE COUNTY

Reed, Hitchens et al's No. 1 Duncan, 1,980 ft. from S and 1,680 ft. from E of Sec. 239, Blk. 2, H.&T.C. Sur. (4,500-ft. cable test)	Shut down 30 ft.

CONCHO COUNTY

Beesley et al's No. 1 Waring Estate, 400 ft. from N and E Sec. 163, T.&N.O. Sur.	Shut down 267 ft.
Betts & Dennis' No. 1 H. E. Woods, 710 ft. from E and 150 ft. from S Sec. 3, H.E.&W.T. Sur.	Shut down 80 ft.
Turner et al's No. 1 Borsig, 150 ft. from S of NE cor. G. Emmig Sur. 130, 6 miles W of Paint Rock	Shut down 1,850 ft.

CRANE COUNTY

Cranfill Bros. and Gulf's No. 1 J. B. Tubb, 2,310 ft. from N and 330 ft. from E of Sec. 8, Blk. B-27, Public School Land	Total depth 5,336 ft.; plugging back to shoot.
E. R. Sides and others' No. 1 B. P. Nolen, 150 ft. from S and 150 ft. from W of N 160 acres, Sec. 8, Blk. 31, H.&T.C. Sur.	Drlg. 305 ft.

CROCKETT COUNTY

Doleman & Moore's No. 1 Perner, 3,135 ft. from N and 1,485 ft. from E of Sec. 36, Blk. 2, I.&G.N. Sur.	Spudded and shut down.

(Continued on Page 112)

East Texas Pools Extending to West

Over 120 First Reports With 74 Completions. First Oil Well in Upshur County. Gladewater Tests Hold Interest

By L. E. Bredberg
Fort Worth Bureau, The Oil and Gas Journal

FORT WORTH, Tex., May 11.—Proven acreage in East Texas is increasing each week due to outpost and extension wells being completed, extending the three pools in various directions, mainly to the west, but in the Lathrop Pool to the north, northwest, west and southwest, while the Joiner area production has been spreading farther to the southwest, and more wells have been proven to the north and northwest in the direction of the Kilgore Pool which is also being extended to the north, northwest, south and southwest, one well being completed only three blocks from the main thoroughfare of the town this week. Last week 90,000 acres was given as an estimate of territory which would eventually be drilled and produced, but due to other extension wells coming in, or coring saturated sand this week, this total has been boosted to around 125,000 acres, with limits of the producing areas still undefined in some directions.

Proration was expected to have some effect on checking, drilling and the staking of new locations, but this week over 120 first reports were announced, with 74 completions reported showing that activities remain unabated. Highways and railroads leading to the production centers are still congested with trucks hauling in equipment from other parts of Texas and surrounding states, and while the four railroads are transporting over 200,000 bbls. of crude per day from the three areas they are also loaded heavily with material and drilling equipment shipped in from all directions, principally from the Gulf Coast, West Texas and Oklahoma and Kansas. Equipment coming from Louisiana and Arkansas is practically all hauled in by truck.

Upshur's First Well

Upshur County, the adjoining county to the north of Gregg County, completed its first oil well this week, May 5, when the Mudge Oil Co.'s No. 1 Richardson estate, in the David Ferguson Survey, being shut in to 100 bbls. daily under the present proration order, came in making 274 bbls. in two hours through forty-two-sixty-fourths-inch choke. Total depth is 3,743 feet, and saturated sand was cored from 3,721-43 feet. This is a 2½-mile extension from the nearest producer, Sultan Oil Co.'s No. 1 Thrasher, a former extension of the Lathrop Pool, both of them opening up several hundred more acres to production to the area.

Several tests are now being drilled between production in the Lathrop Pool, and the Selby Oil & Gas Co.'s No. 1 Snavely near Gladewater, Flannery and Bradley's No. 1 York in the William Carlton Survey, approximately 1 mile east of Gladewater, one of the linking tests between the aforementioned producing areas, being the most interesting test at the present time due to the fact that it cored 28 feet of good looking saturated sand from 3,487-3,515 feet, although there was no volcanic ash cored as is generally the rule in these wells. The test is now coring ahead below 3,515 feet.

Texas Pacific Coal & Oil Co.'s No. 1 fee, in the George Hampton Survey, approximately 1 mile east of the above mentioned link, is another test which is being closely watched for developments, as it means another link in the chain of producers in the Lathrop area. It had 10 feet of saturated sand from 3,564-74 feet and is now shut down to set casing.

Since the discovery of the Snavely well just outside the town of Gladewater in western Rusk County, that town has assumed boom proportions, coming in for its share of new activities and growth, and several rigs are now located just outside the city limits, around the town, drilling having started on several of them.

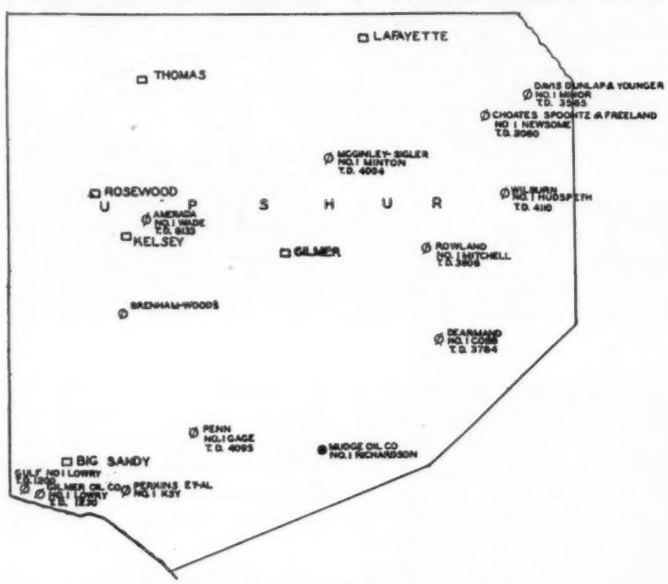
Sinclair Oil & Gas Co.'s No. 1 Cole, in the Samuel Brooks Survey, is still flowing wild with a split casing.

Kilgore Water Situation

The water situation in the Kilgore Pool has apparently not assumed any greater proportions, some of the wells which formerly made water having been plugged back to cut down the amount, or in an effort to shut it off. The Magnolia Petroleum Co.'s No. 1 Florey, in the Peter Holmes Survey, which was first drilled to a reported depth of 3,565 feet and came in making a high percentage of water, has been plugged back to 3,608 feet and redrilled to 3,647 feet, coming in for an initial of 145 bbls. the first 15 minutes, making 26 per cent salt water. The flow is now pinched in to 247 bbls. per day under the present proration order, helping to cut the percentage of water to a minimum, reported at less than 1 per cent.

The East Texas Refining Co. has attempted to plug back its No. 5 Wills, but difficulties were encountered when the cement would not set. Killiam and Phillips' No. 1 Price, in the R. W. Smith Survey, another well making water in the Kilgore Pool, is also being plugged back. It is making 12½ per cent water, while the former well was reported making nearly all water. Gulf Production Co.'s No. 1 Birdsong, in the same pool, is another well reported making almost 100 per cent water. It will probably be plugged back also. It is now standing shut in.

There are 50 wells in the Kilgore Pool having total depths below a datum of minus 3,300 feet which is the danger line in the pool, consequently they can be expected to make water in the near future, especially in view of the fact that water has already come in on the west side, and practically in the heart of the pool, in wells which were drilled below this level. But water will be a long time in covering the whole pool, and displacing production as many have contended, and hundreds of thousands of barrels will continue to be taken out of the pool each week for many weeks to come, although proration is curtailing the daily output, and also causing the wells to be pinched in to a small percentage of their potential, consequently cutting down the dangers of water encroachment and holding it back from the oil sand. Proration will be of good help to this pool in regard to this one condition.


LAFAYETTE
THOMAS
DAVIS DUNLAP & YOUNGER NO. 1 MINOR T.D. 3593
CHOATES SPOONTZ & FREELAND NO. 1 NEWSOME T.D. 3060
McGINLEY-SIGLER NO. 1 MINTON T.D. 4004
ROSEWOOD
UPSHUR
SHURR
HILBURN NO. 1 HUDSPETH T.D. 4110
AMERADA NO. 1 WADE T.D. 6133
KELSEY
GILMER
ROWLAND NO. 1 MITCHELL T.D. 3804
BRINHAM-WOODS
DEARMAND NO. 1 CASE T.D. 3764
PENN NO. 1 GAGE T.D. 4095
MUDGE OIL CO NO. 1 RICHARDSON
BIG SANDY
GULF NO. 1 LOWRY
PERKINS ET AL NO. 1 KEY

Map of Upshur County, in the East Texas Field, showing location of the first producer in the county, Mudge Oil Co.'s No. 1 Richardson, near the Gregg County line, northwestern extension of Lathrop Pool.

Joiner Pool Extended

East Texas Refining Co. and Frank R. Foster's No. 1 Tyiska test, in the R. W. Wilson Survey, across the Rusk County line into Smith County, and approximately midway between Guy E. Lewis' Smith County discovery and the town of Overton, and at least 2 miles west of the nearest extension producer of the Joiner Pool, is another interesting test which is showing for a producer to extend the Joiner Pool to the north and west, and opens more producing territory for the county in which it is located. It cored sand from 3,833-41 feet and flowed while making a drill stem test.

Another test on the eastern edge of Smith County that is vitally interesting is Sinclair Oil & Gas Co.'s No. 2 Mayfield, in the James Jordan Survey, a little over a mile northwest of the Lewis-Cooke discovery of the county. It is checking 10 feet higher than the Tyiska well, having cored ash and sand from 3,843-45 feet, and looking like a possible producer.

Proration in Federal Court

While the three East Texas producing areas are operating under the late proration orders, recently put into effect, there is much disturbance in regard to some of the injunctions which have been granted, and others which are being filed, other bills now pending in the state legislature also affecting the equilibrium of activities in the district.

Alfred Macmillan of the Macmillan Petroleum Corp. of California, and Delaware, which has a potential of 54,000 bbls. per day in East Texas, has filed a petition in Judge Duval West's court in Austin, seeking both temporary and permanent injunctions restraining the Railroad Commission from enforcing its proration orders in Gregg County. The umpire, A. B. Capers, of the Lathrop area, and three members of the commission are named as the defendants, the petition stating that "under the guise of a state employe, Mr. Capers is an employe of certain major companies who pay his salary and therefore his alleged position with the commission is not authorized by law, thereby invalidating his actions in attempting to enforce proration."

The petition also states that proration

EAST CENTRAL TEXAS WILDCATS

Week Ending May 11

Company, well, farm name, section and block—	Remarks:
CHEROKEE COUNTY	
Ben Banner's No. 1 J. Williams Estate, 150 ft. S and 300 ft. W of SE cor. of the N Hogg heirs and in the J. L. Hogg heirs Sur.	Set 390 ft. 10-in. csg.
D. H. Byrd et al's No. 1 Dixie, 1,385 ft. from N along E line of G. W. Forman Sur. from NW cor. of W. H. Felder 854-ac. tract and 150 ft. W at right angles to E line	Reaming 3,880 ft.
Helen-Clare Oil Co.'s No. 1 Mrs. M. P. Perkins, 1,800 ft. from N and 450 ft. from W of survey, Thomas Stafford Sur.	Location.
Fain and McGaha's No. 1 W. A. Shaw, 990 ft. from S and 1,400 ft. from W of W. A. Shaw 128-ac. tract, Isaac Reed heirs Sur.	Rig. 3,267 ft.
McDonald Bros.' No. 1 Newton, center of 113-ac. tract, Thomas Quevedo Sur., 3 miles N of Jacksonville	Shut down 2,512 ft.
Rowan and Nichols' No. 1 Owsley, 530 ft. from N and 1,530 ft. from E line of Loman Sur.	Drlg. 4,170 ft.
Sinclair Oil & Gas Co.'s No. 1 G. T. Martin, 200 ft. from N and 629 ft. from W line of 62.8-ac. tract, Larkin Baker League Sur.	Drlg. 3,115 ft.
William A. Stone's No. 1 Blount Decker, 900 ft. E of E line of S. Selman Sur. and 1,200 ft. S of N line of E. M. Decker 406-ac. tract in George Ruddle Sur.	Drlg. 4,310 ft.
Walton Oil Co.'s No. 1 E. Singletary, 250 ft. W and 150 ft. N of NE cor. of M. Lacey Sur. and in Water Sur. on Singletary 84-ac. tract	Shut down 2,700 ft.
DELTA COUNTY	
Delta Development Co.'s No. 2 Hays Kinney, 300 ft. S of No. 1 Cooper, Townsite Sur.	Coring 3,078 ft.
D. S. Hoods' No. 1 J. J. Balser, 185 ft. from S and 550 ft. W of Balser 40-ac. tract in SE cor. T. B. Laddin Sur.	Shut down 1,559 ft.
Worthington and Stedman's No. 1 W. H. Dejehett, 160 ft. from S and 776 ft. from W of 62-ac. tract, E. Chick Sur.	Shut down 2,300 ft.

(Continued on Page 108)

is in violation of both federal and state constitutions and antitrust laws. Mr. Macmillan also stated that his potential was 54,000 bbls. per day, and its allowance under proration was only 1,455 bbls. daily, while he has contracts calling for several thousand barrels of oil within the next 60 and 90 days that he cannot fulfill while his wells are curtailed.

J. D. Moore, state district judge, set the injunction petition of the Central Pipe Line Co., operating in the East Texas Field, for trial May 22. He overruled a petition for a temporary injunction after Fred Upchurch, representing the Railroad Commission, had pointed out that penalties for violation of the proration order ceased with the filing of the suit and that a temporary injunction, therefore, would serve no purpose.

Still another injunction suit was filed in Judge Moore's court by the Nat Hunter Producing Co. and the Nat Hunter Oil Co., which said they had wells in Rusk and Gregg Counties capable of producing 35,000 or 40,000 bbls. daily.

Drilling Operations

There are at present 414 drilling wells in the 11 active counties of East Texas, Gregg and Rusk Counties being the center of the majority of drilling operations, with 139 drilling wells in the Kilgore area which extends over into Gregg County from Rusk, and 123 drilling in the Joiner area. There were 34 first reports for the Joiner area this week with 24 wells completed, and 52 new locations in the Kilgore area with 33 completions for the week, marking one of the busiest weeks known in the district in staking locations and completing wells.

The Capital Producing Co.'s No. 1 Osborne changed the tables this week when it was abandoned as a dry hole, something which might be called out of the ordinary in Gregg and Rusk, where it seems that all tests proved productive, generally proving large extensions and opening up more producing territory. Dry holes in these two counties are generally unheard of. The tst is in the R. R. Bobbitt Survey, Gregg County, approximately 2 miles north of the Florey tract in the Holmes Survey, where there are two wells making large quantities of salt water. It was abandoned at a total depth of 4,010 feet after encountering dry sand at 3,750 feet which proved unproductive. The Vitek Combined Group is drilling a test a little over a quarter of a mile west of this "duster," apparently another dry hole, limiting production to the northwest of the Kilgore Pool.

The Pilot Oil Co., which has not had its wells yet curtailed by proration, has agreed to allow its wells to be gauged and put under proration if the Arkansas Fuel Oil Co. would connect them with a gathering line. The latter company has agreed to do this, which gives the Lathrop Pool almost 100 per cent proration now. Production from the 38 producing wells in the pool ran 30,530 bbls. on May 9, with four wells shut in and with no information on three others. The Arkansas Fuel Oil Co. and Arkansas Pipe Line Co. are running over 9,000 bbls. per day out of the Lathrop Pool by tank car and an 8-inch line which goes to Shreveport. It is the largest transporter and producer in this pool.

The Pure Oil Co. has plugged and abandoned its No. 4 Maxfield in the Nacogdoches County School Lands Survey on the western side of the Van Pool, at a total depth of 2,993 feet.

There are now 237 producing wells in the Van Pool, Van Zandt County, having a total potential of 461,720 bbls. per day through eleven-sixteenths-inch choke on tubing. Under new proration orders the pool has an allowable of 45,000 bbls. per day, or a little under 10 per cent of its potential. The allowable production per well ranges from 100 to 443 bbls. daily. Only 5 wells have been completed in the pool since the last proration period of April 15 to May 1.

Federated Oil Co.'s No. 3 Mayfield-Alford, sand 3,586-97 feet, initial production 98 bbls. first seven hours through casing, total depth 3,671 feet. Gulf Production Co.'s No. 3 R. N. Brightwell, top sand 3,572 feet, initial production 70 bbls. per hour through three-fourths-inch tubing choke, total depth 3,612 feet. Same company's No. 5 Rosa May Griffin, top sand 3,603 feet, initial production 180 bbls. per hour through two three-fourths-inch chokes on tubing, total depth 3,619 feet. Gulf Coast's No. 2 Giles, sand 3,704-54 feet, initial production 100 bbls. per hour through tubing, total depth 3,755 feet. Helis and Collin's No. 1 Birdsong, top sand 3,612 feet, initial production 2,200 bbls. in eight hours through 3-inch valve on casing, cracked, total depth 3,675 feet. John W. Hoosier's No. 1 Talliaferro, sand 3,651-67 feet, initial production 40 bbls. per hour through tubing choke, total depth 3,710 feet.

Houston Oil Co.'s No. 1 W. R. Brightwell, top sand 3,580 feet, initial production 124 bbls. per hour on six-hour test through eleven-sixteenths-inch tubing choke, total depth 3,605 feet. Same company's No. 3 Brightwell, top sand 3,628 feet, initial production 40 bbls. per hour through twenty-sixty-fourths-inch tubing choke, total depth 3,649 feet. Same company's No. 5 W. R. Brightwell, top sand 3,622 feet, initial production 220 bbls. per hour through 1-inch casing choke, total depth 3,652 feet. Same company's No. 3 L. D. Crim, top sand 3,696 feet, initial production 115 bbls. per hour through 1-inch tubing choke, total depth 3,726 feet. Same company's No. 2 S. S. Laird, top sand 3,613 feet, initial production 48 bbls. per hour through twenty-five-sixty-fourths-inch tubing choke, total depth 3,653 feet.

Humble Oil & Refining Co.'s No. 15 L. D. Crim, top sand 3,608 feet, initial production 65 bbls. per hour through eleven-sixteenths-inch tubing choke, total depth 3,663 feet. Same company's No. 18 L. D. Crim, top sand 3,594 feet, initial production 65 bbls. per hour through eleven-sixteenths-inch tubing choke, total depth 3,603 feet. Same company's No. 3 Kangerga, sand 3,707-22-26-32 feet, initial production 97 bbls. fluid first hour. 20 per cent drill water, total depth 3,732 feet. Same company's No. 4 Kangerga, sand 3,674-3,722 feet, initial production 92 bbls. per hour through eleven-sixteenths-inch tubing choke, total depth 3,722 feet. Same company's No. 1 R. H. Laird, top sand 3,610 feet, initial production 101 bbls. per hour through eleven-sixteenths-inch tubing choke, total depth 3,645 feet. Same company's No. 7 Peterson, top sand 3,594 feet, initial production 48 bbls. per hour through eleven-sixteenths-inch tubing choke, total depth 3,606 feet. Same company's No. 8 Peterson, top sand 3,586 feet, initial production 90 bbls. per hour through eleven-sixteenths-inch tubing choke, total depth 3,600 feet.

H. L. Hunt's No. 1 Fair, sand 3,663-3,707 feet, initial production 125 bbls. first hour pinched through tubing, total depth 3,707 feet. H. L. Hunt's No. 3 Young, sand 3,674-3,760 feet, initial production estimated 100 bbls. per hour through tubing, total depth 3,760 feet. Laster and others' No. 1 Maxwell, sand 3,552-3,566 feet, initial production 500 bbls. first 10 hours through tubing, total depth 3,733 feet. La-Tex Oil Co.'s No. 1 Major Kennedy, top sand 3,686 feet, initial production 1,480 bbls. in 24 hours through 1½-inch choke, total depth 3,747 feet.

Magnolia Petroleum Co.'s No. 1 Peterson, top sand 3,605 feet, initial production 236 bbls. first hour through three-fourths-inch tubing choke, total depth

(Continued on Page 106)

Fire Is Out But Well Flows Wild

Sinclair Oil & Gas Co.'s No. 1 Cole in Gregg County Pouring Out 1,500 Bbls. an Hour Through Split Casing

By L. E. Bredberg

GLADEWATER, Tex., May 9.—After burning 193½ hours, the Sinclair Oil & Gas Co.'s No. 1 Cole in the Samuel Brooks Survey in western Gregg County was extinguished with two shots of nitrogelatine by Myron M. and Floyd P. Kinley assisted by a volunteer worker, H. H. Bunch. The fire had destroyed the lives of nine men and consumed, if the estimates are correct, nearly 200,000 bbls. of crude oil. It is still flowing wild at the estimated rate of 1,500 bbls. an hour and Sinclair officials report that there is no water showing. Practically all the oil is being saved.

If there had been no explosion, one more minute's work and a flanged plug, commonly called a boll weevil, which was screwed into the bottom of the kelly joint, thence into the drill pipe, would have set in the hole, and the well shut in. It was while lowering this plug that the explosion occurred, letting the string of pipe, plug and kelly drop, shearing off the lead of the plug, and allowing the pipe to fall to the bottom with about 20 feet of the kelly joint extending above the 6⅝-inch casing out of the hole, the swivel joint resting on this, and the traveling block falling and hanging upon the goose-neck. It was this kelly and swivel which gave the Kinleys their greatest trouble, for it had to be removed before the fire could be shot out with the nitrogelatine brought by plane from Oklahoma to do the work.

All machinery, drill pipe, other metal parts and debris had to be hooked on to by cables and winched out by tractors and trucks. This work consumed the better part of three days, the men working 20 hours or more per day, with only three or four hours rest each night. When this was pulled out from near the flames, an improvised battering ram made up of four 15-foot joints of pipe welded together and suspended from a tripod made of 2-inch pipe welded together, was tried in an effort to batter off the white hot kelly joint, but this did not accomplish the purpose. Three hooks were then welded into one end of the 60 feet of pipe and one of these was hooked into the swivel by Floyd Kinley and Bunch who did the close-up work after Myron Kinley was injured on Wednesday afternoon, April 29.

A cable was hitched to the other end of the 60 feet of pipe and a tractor was used in pulling over the kelly joint and bending it near the top of the 6⅝-inch casing. This threw the goose-neck, pouring out burning oil, into another position, throwing the fire into the air instead of down toward the ground as it had been doing, and adding to the difficulties of the job. A crew of men then hauled the attached hook and cable around and around the fire, giving the kelly 14 turns, and loosening it in the hole.

Blowing Away the Kelly

The following morning a 200-pound shot of nitrogelatine was placed near the top of the casing, the kelly was pulled around and over it, and the cable which was used in turning it was tied down. When the gelatine was detonated the kelly was blown free from the hole, which then spouted the oil and flames straight into the air as was desired, cutting down the terrific heat, which allowed a second shot to be placed directly over the hole on an improvised trough of welded pipe. This second shot of 200 pounds of gelatine was detonated, the flames rolled into the air, parting from the stream of gas and oil, and the Kinley brothers had conquered another great oil fire.

Packing the Shots

The shots of gelatine were made up by packing the 200 pounds of explosive in asbestos, and into 50-gallon steel oil drums, the fuses placed into this charge and connected to about 250 feet of asbestos wrapped cable which led away from the fire to a safe position from which M. M. Kinley made the detonating connection with an electric hand detonator, shooting the spark into the torpedo which had been placed at the top of the casing, and at the first shot knocking the kelly joint and rotary table from the hole, and the second shot snuffing out the blaze.

Danger Still Existed

Combating the fire was a highly dangerous job, but another great danger still existed. This was the shutting in of the gas and oil and making connections. The top of the 6⅝-inch casing had been jammed and damaged by the second shot, pinching in part of the spray, but adding to the difficulties of the crew of Sinclair men who had been picked to shut in the well. While working in oilskins and rubber boots, they became covered with oil, sickened by the gas and were in a highly dangerous position if another such accident happened.

A blacksmith at Arp who worked two days welding and constructing a special appliance ready to be screwed down to shut off the oil when the bottom of the appliance, which was in the form of an overshot bowl, was put in place on the surface casing, snubbed by inverted slips, and clamped on by a large clamp which had been placed in position around the 12-inch pipe and ready as soon as the overshot bowl could be wrestled into position by the crew.

As soon as the fire was snuffed out, a 96-foot wooden derrick which had been erected near the edge of the woods, about 300 feet from the flames, was rolled down the incline on a track of timbers, short pieces of 3-inch pipe being used as rollers, and a pair of mules, cable and block moving it slowly forward into position over the hole. A wire line which had been placed over the block on top of the derrick was used in raising the overshot and valve into place, a truck winch hoisting the appliance and dropping it into place over the hole.

But due to the gas pressure and heavy stream of oil shooting out of the hole, the overshot bobbed about above the top of the surface casing and 6⅝-inch casing like a cork, requiring three snubbing lines on different sides to help control it as it was carefully and slowly lowered into place and clamped on. The first day's work did not meet with success due to the packing leaking, and another day was required before the appliance was fully settled in place and the well shut in, but for a short time only. The casing was split, probably by the force of nitrogelatine and the well started flowing again. This was unforeseen and may cause additional trouble in the work of shutting in the well which at this writing was absolutely wild.

Special bronze, nonsparking hammers, wrenches and chain wrenches made by the American Metal Products Co. were brought by airplane from Milwaukee, Wis., to use in shutting in the well, to prevent any sparks from igniting the gas and oil again.

Before shots were placed to snuff out the flame Foamite was sprayed on all burning stumps, material and metal all around the well so as to prevent a chance flame or smouldering ember to cause an immediate flare-up, causing the necessity of another shot. Water from six hose, forced by a pump on the Sinclair Oil & Gas Co.'s G.M.C. fire truck which had been driven down from Oklahoma City, was also used in soaking the surrounding ground with water, and quenching fires which sprung up continuously on stumps and trees for yards on either side of the fire.

Pipe Line Construction News

NORTH CENTRAL LEASES SINCLAIR LINE FOR GAS

CHICAGO, May 11.—Standard Oil Co. of Indiana has leased its 710-mile crude oil pipe line which extends from Welch, Wyo., to Freeman, Mo., to Kansas Pipe Line & Gas Co. and North Central Gas Co. who will use the line for transportation of natural gas from Welch fields. The lease expires January 1, 1935. The Kansas company has the east two-thirds of the line and the North Central company the northwest third. The system is a combination of 10 and 12-inch line. At the Cozad, Neb., station 110 bbls. of oil are being taken from the pipe.

The western terminus of the Sinclair line is in Salt Creek and the eastern terminus at Freeman, Mo., about 20 miles from Kansas City. The entire line is 720 miles long. The North Central Gas Co. will use about 175 miles of the line, the western terminus being at the Sinclair tank farm east of Glenrock and the eastern at Bridgeport, Nebr. More of the line may be used in another year to supply places farther east in Nebraska with natural gas.

Pipe for the line from Glenrock to the tank farm has been purchased from the American Iron & Metal Co. The pipe consists of 10-inch and two joints will be welded by employes of North Central Gas Co. at the pipe yards and trucked to the right of way. The system is to be completed early in the fall.

Laterals will be laid from near Guernsey to Wheatland and Laramie with systems at intervening towns. It is also planned to lay a lateral from Bridgeport to Alliance, Nebr.

TEN BIDS SUBMITTED FOR AMARILLO SYSTEM

AMARILLO, Tex., May 11.—Ten bids—two complete and eight on material only—for the contract to furnish Amarillo with a gas distribution system were opened at a special session of the city commission.

Williams Brothers, Inc., of Tulsa, and the W. E. Callahan Construction Co., of Dallas and St. Louis, Mo., were the two firms to submit bids on a "turnkey" job or the complete system, installed and ready for operation.

Proposals to furnish material only for the system were submitted by Briggs-Weaver Machinery Co. of Dallas; Dempster Mill Manufacturing Co., of Amarillo; Keller-Wright Co. of Kansas City; National Supply Co. of Fort Worth; Morrow-Thomas of Amarillo; Pittsburgh Equitable Meter Co. of Dallas; Mueller & Co. of Dallas; Hanlon-Waters, Inc., Tulsa.

Plans and specifications for the gas distribution system call for nearly 300 miles of pipe, 10,000 domestic meters and other equipment.

The Pittsburgh Equitable Meter Co.'s bid on 10,000 domestic meters was $9.21 each.

SELLS COATING DIVISION

R. D. Hardcastle, J. B. Heymes and Edgar R. Pitcher, three of the organizers of Resistcor, have bought the coating division of Resistcor Engineering Corp. and are incorporating under the name of "Resistcor Products, Inc." Offices and warehouses will be maintained at Tulsa, Houston and Memphis. The officers of Resistcor Products, Inc., will be: R. D. Hardcastle, president; J. B. Heymes, vice president, and Edgar R. Pitcher, secretary-treasurer, all well known in the pipe line coating business.

BUTLER, MO., LINE

BUTLER, Mo., May 11.—The C. L. Berger Construction Co. has commenced installing the main gas supply line through the city for connection with the line from Kansas and the gas distribution system for the Western Service Corp. of Oklahoma City, which holds a franchise here. The work is expected to be completed by July 1.

Butler will be the central distribution depot for Adrain, Amoret, Appleton City, Deepwater, Montrose and Eldorado Springs.

PIPE LINE INQUIRIES INVOLVING MILLIONS

YOUNGSTOWN, Ohio, May 9.—Pipe line inquiries involving several millions of dollars constitute one of the most hopeful aspects of the present iron and steel situation. There are over a score of inquiries before the pipe trade, some of which it is confidently felt will materialize into business within the next 60 days. The projects include a number of gas transmission lines in the West.

Shell Oil Corp. is in the market for 200 miles of 10-inch pipe; Atlantic Refining will award shortly contracts for 200 miles of 6-inch and 8-inch tubing; a subsidiary of Ohio Oil Co. is figuring on an oil carrying line involving 100 miles of pipe, which with feeders, will cost in excess of $1,000,000. Sinclair Oil Co. is planning a 90-mile pipe line which will involve upward of $1,000,000.

A. O. Smith Corp., Milwaukee, has an older of 35,000 tons of 20-inch material from Electric Bond & Share Co., and one for 9,000 tons from Ohio Oil.

Veteran pipe manufacturers see a heavy prospective demand over the next few years, arising chiefly from requirements for pipe line projects.

NEW PUMPING STATION TO BOOST OIL DELIVERY

A Diesel engine powered pumping station is being erected by the Illinois Pipe Line Co. near Brookville, Ind., to increase the capacity of an existing line. The 8-inch oil line, which runs 120 miles from the pumping station at Elwood, Ind., to the Standard Oil Co. of Ohio's refinery at Latonia, Ky., makes a present delivery of 8,000 bbls. per day. A pair of 4-cylinder 130-horsepower Diesel engines, recently shipped from the Cooper-Bessemer plant at Grove City, Pa., will direct drive triplex vertical pumps through reduction gears. The new location is in southeastern Indiana, near the Ohio border.

PINEVILLE, KY., LINE

PINEVILLE, Ky., May 11.—The Eastern United Gas Corp. will lay a 10-mile gas line from gas wells owned by the Distill-Martin Gas Co., which will be a 6-inch line from the Himyar gas field in Knox County to Pineville. Work will start within a short time on laying the line, figuring on supplying Pineville within 90 days from the time work is started. It is said the same interests have a franchise to furnish the mountain town of Middlesboro before winter.

MEMPHIS TO JACKSON LINE

The Memphis Natural Gas Co. is to build an 8-inch extension to its line from Memphis north to Jackson, Tenn., a distance of about 100 miles. Ralph E. Davis, of Pittsburgh, drew up the specifications, and the contract is to be let by the Union Utilities Co., New York City.

ANNUAL STATISTICS ON PIPE AND TUBE

By B. E. V. Luty

PITTSBURGH, Pa., May 9.—The annual statistics of pipe and tube production in 1930 have been issued by the American Iron and Steel Institute, but as formerly they appear to omit the heavy production of electric weld line pipe at Milwaukee, and presumably therefore all production of electric weld pipe. Production of "oil country goods" as reported appears to include such line pipe as was made by ordinary welded pipe mills and by seamless tube mills, and amounted to 689,779 gross tons of welded and 913,763 tons of seamless, making a total of 1,603,542 tons, which is 18.5 per cent decrease from 1929. There was 8.4 per cent increase in seamless and 36.8 per cent decrease in welded. These divergent changes were quite natural, for welded oil country goods had reached a record high in 1923, then declining irregularly, so it was natural enough for them to have a large decline from 1929 to 1930, whereas seamless oil country goods had been gaining rapidly almost year by year and were at their high in 1929. Thus they had momentum, so to speak, preventing their slipping nearly as much as welded oil country goods from 1929 to 1930.

Including standard pipe, boiler tubes, etc., total production reported for 1930 was 2,247,388 tons of welded and 1,193,717 tons of seamless, the gross ton being used in all the statistics. In addition, there was electric weld, not reported.

Prompted by not a little shading, pipe mills have now formally reduced the price on standard pipe in carload lots for direct shipment on orders placed through jobbers, whereby the consumer gets a price, beyond the card discount, of one point, 5 per cent and 5 per cent, the regular price previously having been a single five. The jobber gets his former extra percentage for his margin. There is no change in less carload direct shipments, nor in discounts to jobbers for shipment to jobbers' stocks. In some quarters it is argued that a revision will eventually have to be made in that matter also, it being claimed that with the prices existing at the moment a jobber can buy pipe cheaper for shipment to a customer than for shipment to himself, whereby he might easily be tempted to create a dummy customer.

PLAN NEW LINE TO MEXICO

MONTERREY, Mexico, May 9.—An extension of United Gas Co.'s line from Monterrey to Saltillo, thence to Torreon, approximately 250 miles, will be constructed if negotiations for franchises and government concessions are successful. The gas which the company is furnishing domestic and industrial consumers of Monterrey comes from the border fields of Texas in the Laredo district. Some gas has been discovered recently in the Aldamas district of Mexico, just south of the fields on the other side of the Rio Grande, and if found in sufficient quantity the fuel will be obtained from the new source of supply.

MEXICO CITY LINE

The 223-kilometer pipe line that Mexican Eagle Oil Co. is building from Palma Sola, state of Vera Cruz, to Mexico City, will be completed June 30. Fifty kilometers of pipe have been laid and welded, work on seven pumping stations is well advanced and construction of 21 receiving and storage tanks at the refinery and booster stations is progressing satisfactorily. The refinery in Mexico City will probably be finished with completion of the pipe line.

HUMBLE TO REDUCE RATES

WASHINGTON, D. C., May 9.—Humble Pipe Line Co. has filed tariffs with Interstate Commerce Commission proposing to reduce rates about 20 per cent on transportation of crude oil from Texas fields to Texas and New Mexico refining points. The reduction would be effective June 6.

Tariffs afford the required statutory notice of 30 days advance announcement. The commission last week declined to permit the pipe line company to put in these rates on less than statutory notice under which the company proposed to initiate them on one day's advance announcement.

Tariffs are subject to suspension if objected to, which would delay their effective date pending an official inquiry to determine their reasonableness.

KENTUCKY NATURAL INDIANA EXTENSIONS

TERRE HAUTE, Ind., May 11.—The Kentucky Natural Gas Co., Owensboro, Ky., has contracted to furnish natural gas to 21 leading industries of Indianapolis, according to M. D. Curran, vice president and general manager of the company. The Kentucky Natural Gas Co., a subsidiary of the Missouri-Kansas Pipe Line Co., has under construction a line from the fields of western Kentucky to the Terre Haute area. Mr. Curran states construction of branch lines to Indianapolis from Terre Haute and Brazil, Ind., would be started soon and would entail an expenditure of $2,000,000.

The lines of the Kentucky Natural Gas Co. have already crossed the Ohio River at Evansville. The lines are now being laid from Terre Haute to join with those at Evansville. The company furnishes gas to the Owensboro Gas Co.

W. J. Hinchey is the manager in charge of the Kentucky Natural Gas Co. in Kentucky, with headquarters in Owensboro, Ky.

SUN AND YOUNT LEE TO LAY 200-MILE LINE

DALLAS, Tex., May 12.—J. Edgar Pew, vice president of the Sun Oil Co., and executives of the Yount Lee Oil Co., are engaged in closing contracts for a 200-mile 10-inch arc welded line to be laid jointly by the two companies from the Lathrop area, Gregg County, to Beaumont, Tex., where both companies have loading docks and ship to the East Coast. Four, six and eight-inch gathering lines and laterals will serve the producing areas in Gregg, Rusk and Smith Counties. A survey is now being made and right of way purchased and line is to be completed in 35 days to serve leases owned by the two companies in East Texas.

BIG BOOSTER PLANT

WICHITA, Kans., May 11.—A big booster plant is expected to be built by the Texas Panhandle Gas Co. on a 40-acre tract near Haven. The booster station will be built in connection with the pipe line being laid from the Texas fields to Chicago. Employes of the Reno County engineer's office were employed to make a survey of the property by the Brokaw, Dixon, Garner & McKee Co. of Kansas City, construction company which is in charge of the pipe line work for this district.

The booster station will be one of many to be built at intervals of 75 miles along the pipe line route. The plans include at the Haven station 14 homes for employes who will be permanently stationed at the plant.

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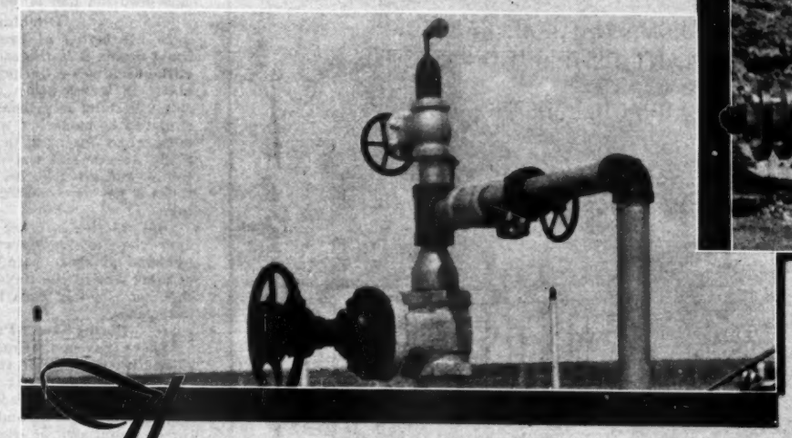

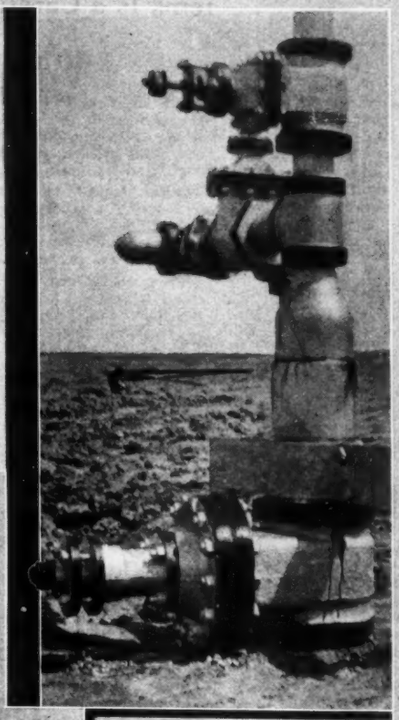

Picture above shows 42,000,000 foot gas well in Carson County, Tex. Jarecki equipment includes Fig. 1004-A, Master Gate Valve; Fig. 1002, Flow and Pinch Gates; Fig. 1000, L. E. Tees; Kew Style G. J. Flange Union.

Illustration at left shows 38,000,000 foot gas well in Carson County, Tex.—400 lb. pressure. Jarecki equipment includes Fig. 1004-A, Gate Valve with Wheel.

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When the engineer of an oil company sees on a valve or fitting the JARECKI Diamond "J" he knows that no further investigation is necessary.

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How Natural Gas Gets to Your Home

Laying Out of City and Village Gas Distributing Systems Is a Carefully Studied Engineering Procedure

By L. G. E. Bignell
Petroleum Engineering Editor

Much has been written about the immense gas pipe line systems that have and are now being laid from gas fields to middle western and eastern cities, but little has been said about the very important work of actually distributing this gas to the ultimate consumer in the town and city.

The main gas lines vary in size from 6-inch to 26-inch and operate under pressures of from 100 to 750 pounds per square inch and vary in length from a few miles to 950 miles, the length of the line from Panhandle gas fields to Chicago, Ill.

The size of these lines and the new features introduced into the construction of them has made much copy for writers for technical papers, the daily newspapers and magazines, but if this gas carried by these great systems was not actually delivered into the home of the ultimate consumer there would be little reason for these projects for the domestic supply of gas is perhaps more important than the industrial demand—at least it affects a greater number of people.

This story will deal wtih the problems confronting the local gas companies after the gas is ready for delivery to them at the town or city border, to which point it has been transported at high pressures.

The first step is to determine the relative size of the system needed to supply the town or city's requirements and if it is a small city and the total revenue to be derived from such service is relatively small it will probably be found most economical to install what is known as the high pressure distributing system in which system the gas is handled to the customer's property line at from 6 to 10 pounds pressure in the gas mains.

If on the other hand the system is to be more extensive and the revenue greater the low pressure system will be used which is in reality a combination of the high pressure distributing system for the main loops within the city with low pressure lines serving the customer at his property line. This low pressure system is more flexible in its operation, as gas can be delivered from it at pressures varying from 4 to 6 ounces up to 6 to 10 pounds, depending upon where connections are made to the service lines.

High Pressure System

The great gas transportation systems that now traverse this country pass close to or through hundreds of small towns and villages which desire natural gas service.

However, this gas in the main line is under high pressure and can only be used for domestic or industrial purposes by stepping this pressure down to much lower pressures, say from 6 to 10 pounds at the property line and there it is again reduced by use of a Reynolds or similar type regulator to from 4 to 8 ounces for use in the consumer's burner.

At the border of a town of from 500 to 2,000 people it is common practice to establish a regulator and metering station where the gas is metered from the main trunk line to the town's distributing system and also reduced in pressure.

This system may consist of a 4 or 6-inch pipe line that will loop the corporate limits of the town and carry gas at from 6 to 10 pounds. From this main loop there will be laterals laid at proper intervals that will usually run through alleys, or perhaps down streets, and actually carry the gas to the consumer's property line. These laterals will be made from 2 or 3-inch pipe. All of this system is laid from 18 inches to 2 feet under the surface in the southern states and deeper to accommodate the colder weather conditions in northern areas.

From the 2-inch laterals it is common practice to install gas-pressure regulators or reducers to reduce the pressures from 6 or 10 pounds to from 4 to 8 ounces which is the pressure required for actual burning of the gas in stove or furnace,

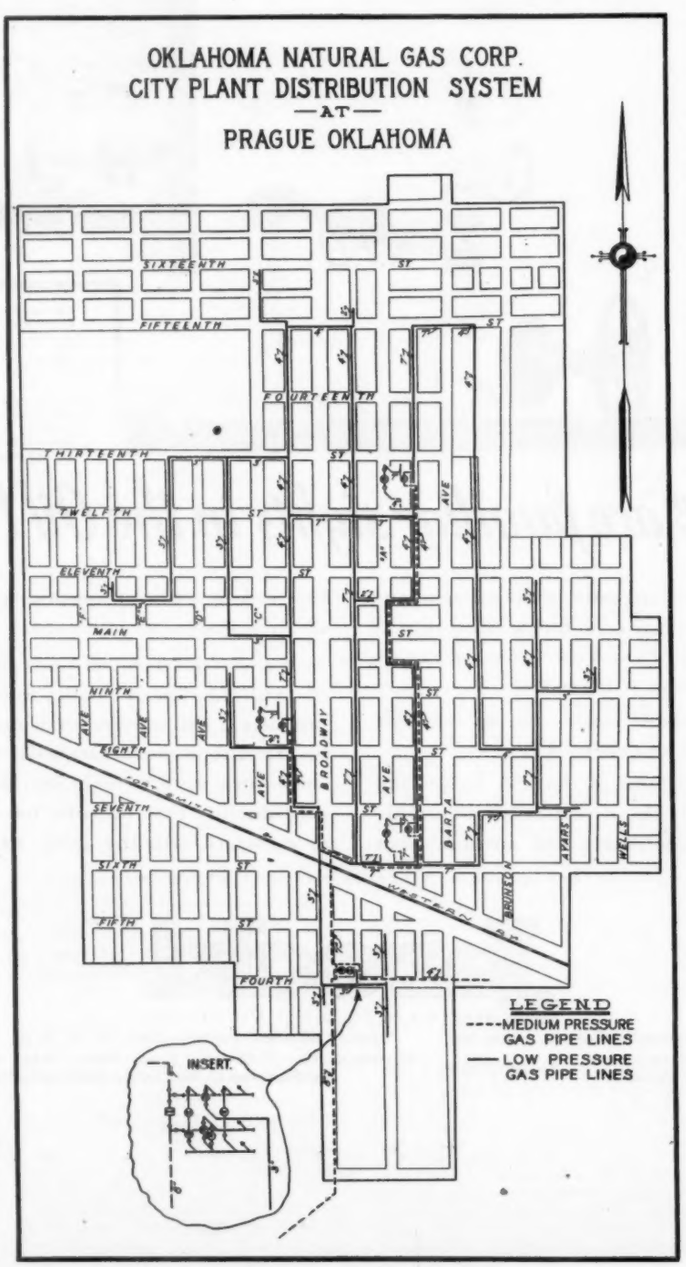
From the 2-inch lateral in alley or street it is usual practice to connect to 1-inch short pipe line that will carry the gas from the lateral to the property owner's regulator or pressure reducer and his gas meter at the property line. This reducer drops the pressure of the gas from the lateral line pressure of 6 to 10 pounds to from 4 to 8 ounces for actual use in the burner of stove or furnace.

From the meter the customer has the line laid to the house and it is good practice in a system of this kind to use 1¼-inch pipe for this service because the gas has been reduced from high to low pressure at the property line and should have some place for quick expansion and some storage space. This prevents to some degree a deficiency in gas when the peak load is on the lateral, as may be the case in the early morning when the house is being heated and breakfast prepared by a majority of the users.

Dead End Lines to Be Avoided

In this system the only place where low pressure gas will be found is in the pipe from property line to house and as all of the balance of the system is under relatively high pressures it has been found that it is less costly of installation and maintenance, but to make it satisfactory for the consumer it is quite necessary that the main service line completely loop the town and that no customer is off on a dead-ended line where pressures and gas volume will depend upon peak load conditions on that section.

If a dead-ended line is used it will be found that the customers nearest the dead end of the pipe will at times have little or no gas because those customers nearer the main supply will use it more rapidly than the gas will pass into this dead-ended pipe. This detail is so well known, however, that it is very seldom that gas companies lay lines of this kind. If used they are for temporary conditions only, and will later form one leg of a looped line to serve an area of which this dead-end line is one side.



Ditching

In the laying of town and city pipe line systems it is the usual thing to ditch with machine or by hand to a depth of about 18 inches below the surface. Machine ditching is satisfactory where long runs can be made but where the gas line must cross an area in which there already are sewers, water lines, telephone cables, and other buried systems it sometimes is not as economical as hand ditching.

One practice in using the ditcher is to have the ditching crews dig the trench by hand at those points of intersection of other buried lines and the ditcher can then quite safely excavate the intervening spaces.

Boring Under Pavements

Where pavement must be broken or sidewalks passed it is the usual practice to use hand labor. In passing under a pavement an auger made of 4 or 6-inch pipe split at one end and formed to make three or four cutting edges is used. This auger is fitted at the end opposite to the cutting end with a reducing nipple to 2-inch size, and a joint of 2-inch pipe used for stem. The body of the auger is slotted lengthwise to permit dirt to work out and this is supposed to allow the operation to proceed for quite a distance before the auger is withdrawn from the hole but in actual practice it is found that from 6 to 24 inches of hole at a time is good progress.

The power for rotating this auger is secured by men with lay tongs turning the 2-inch pipe, and to force the bit into the ground another man uses a jack against which the free end of the 2-inch pipe rests. This jack consists of a jack board laid on the bottom of the ditch from which the augered hole is being driven. The board is made from a 2"x12" plank to which cleats are nailed at 6-inch intervals.

The man operating the jack selects a 2"x12" plank of suitable length to give him the required leverage and sets it up back of one of the cleats and the 2-inch pipe end is set against this lever board and the pressure applied to the upper end so that the auger is brought in contact with the surface to be removed.

The other men then rotate the auger with the lay tongs until no forward progress is made when the auger is pulled out of the hole, and at the same time cleans it of loose dirt. When cleaned the auger is run back into the hole again and the operation repeated. As the hole is advanced the board used for a lever is moved up along the jack board from one cleat to another and when the end of this board is reached the board itself is moved up and again staked for repetition of the operation.

While this operation results in a much smaller amount of earth being removed

MALTESE CROSS NO. 1642

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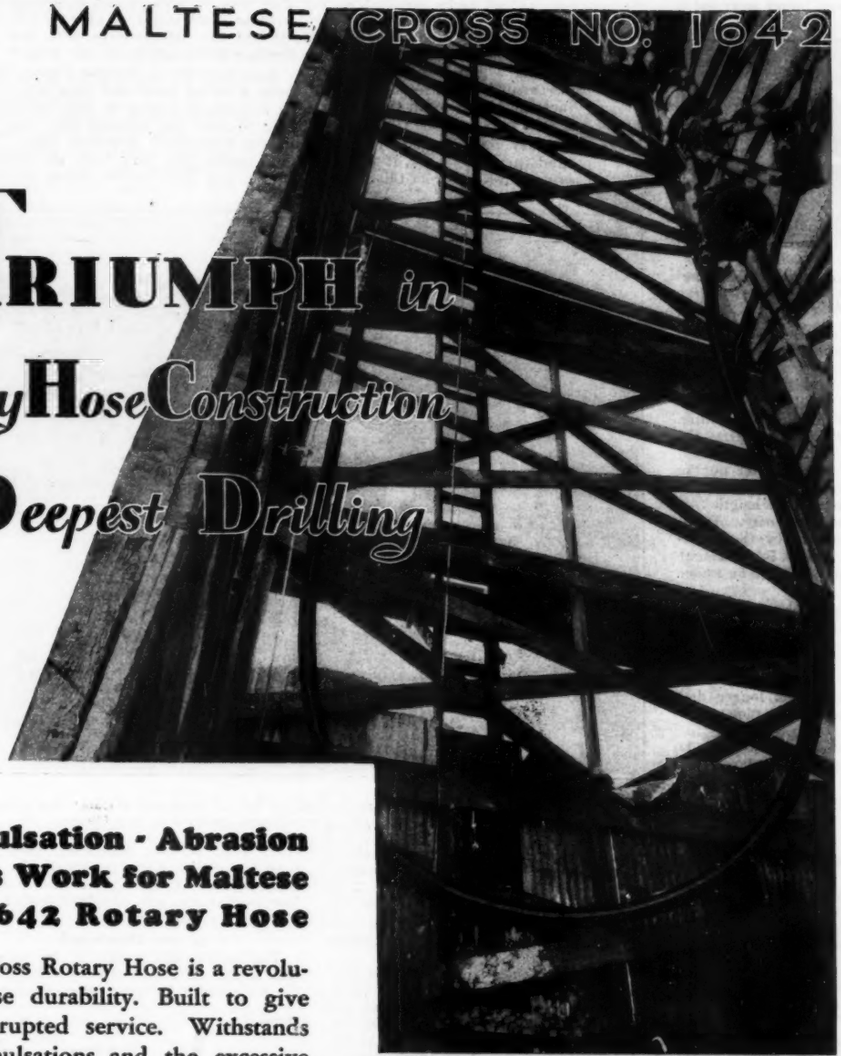

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OIL FIELD DISTRIBUTORS

OIL WELL SUPPLY CO.

than would be required by tunneling it has been found that in many instances it is not as rapid or cheap as actually digging under the pavement for obstructions may be encountered in the form of buried sewers, pipes, and other objects and even though the hole may be nearly finished it will then be necessary to start all over again at another place.

It has therefore been found more satisfactory in many instances to have men used to working in small spaces in coal or metal mines tunnel these places and it is surprising how rapidly they can do this work and the small hole actually dug to permit them to make the opening.

Eleventh Street measuring and scrubbing station of the Oklahoma Natural Gas Corp., Tulsa.

These men usually work in pairs, the man making the hole being followed by a partner who throws the dirt on out to the open ditch, and as such tunnels are seldom in excess of 20 feet in length this system works very satisfactorily. If an obstruction is encountered by the workman the size of the tunnel is such that the gas pipe can be passed over or under the buried object.

Low Pressure System

In larger towns and cities where the use of the high pressure system just described would entail the outlay of a lot more money in larger pipe and accessories to carry the gas over much longer distances, what is known as the "low pressure system" is used.

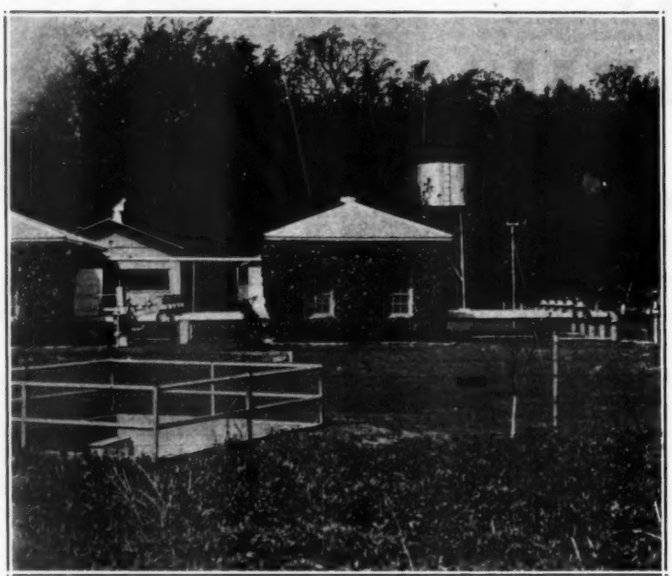
As in the high pressure system it is necessary to have a pressure reducer and metering station at the corporate limits of the municipality where the gas from the main trunk lines is reduced to 6 to 10 pounds pressure and the line reduced in diameter to suit the conditions of the area to be served with gas. These lines may vary in size from 6-inch diameter upward but for the purpose of explaining the system it will be assumed that 6-inch diameter pipe is used for the high pressure line within the city limits.

Pressure regulating station in Terwilliger Heights, Tulsa, Oklahoma Natural Gas Corp.

This 6-inch line carrying from 6 to 10 pounds pressure gas will be laid so as to form one or more loops around various parts of the city, and also with the idea in mind that it can serve industrial plants or large consumers with the 6 to 10-pound gas at their plants if so desired, the consumer to provide the regulators and distributing system within his own property lines to suit his particular needs.

The high pressure line will usually form three sides of a square bounding the principal district to be supplied with gas. At each corner of the loop and at the ends of the lines regulators or pressure reducers will be placed. From these points a secondary system of pipes will be laid that parallel the three-sided high pressure lines and also close in the fourth side of the square.

This secondary loop is made from 8-inch pipe and carries the gas at from 6 to 8 ounces pressure and from this 6-inch pipe the inside laterals are run up alleys or streets that will serve the individual consumers. These laterals may be 2, 3, 4 or 6-inch lines depending upon the amount of gas to be used by the consumers in the area within the 8-inch secondary loop.



Meter runs at the metering and reducing station of the Oklahoma Natural Gas Corp., southwest of Tulsa. Gate pits in foreground enclosed in pipe fence.

At property lines connections are provided for the consumer's line to the dwelling or other building where the gas will be used that will accommodate from 1¼ to 4-inch diameter service lines. As the gas is already reduced to burning pressure no regulators are needed at the property line as was the case in the high pressure system.

In laying out a system of this kind it is always planned to so place the primary loop carrying the 6 to 10-pound gas to permit of other loops being later added to it so that additional territory may be served without increasing the size of the high pressure loop or disturbing the streets or alleys through which this pipe has been laid.

In all this kind of work modern practice is to use a welded pipe line system, the 40-foot pipes being welded together in joints of from three to four lengths each to permit of easy handling into the ditch. This also permits the pipe to be laid under other lines already in the ground with the minimum of trouble.

The connection provided for customer's takeoffs are usually made by using heavy collars of the same thickness as that of the main line into which they are welded. This type of construction is preferred to welding short pieces of pipe to this line, because this lighter pipe will rust and produce leaks outside of the weld.

Into the collar is screwed a street ell to form a swing joint and into this street ell is screwed a joint of pipe sufficiently long to span the distance from gas line to the consumer's property line. This pipe length will vary with the position of the gas line in the street or alley from 4 to 16 feet depending upon the location of the ditch in which the gas main is laid. At the edge of the property line curb boxes are provided which enclose meter and regulator.

System Illustrated

The accompanying map of the gas system of the Oklahoma Natural Gas Corp. in the town of Prague, Okla., illustrates the typical method used by that company in laying lines to serve a small community. Details will be varied to suit local conditions, but this map outlines the general system in a representative manner.

The pictures show the type of buildings and equipment required to serve a city of about 150,000 population such as Tulsa, and the reducing and measuring stations to be found at the four corners of the city. At these stations the gas is measured and the pressure reduced from that of the high pressure gathering lines bringing the gas from the wells to the intermediate pressures used in the main loops within the city.

Other pictures show reducer stations within the city where the pressure is again stepped down to about 4 ounces for distribution to the consumers.

Kennedy station of Oklahoma Natural Gas Corp., where gas from Osage County is metered, and reduced for distribution to Tulsa.

In Osage County, Oklahoma, just north of Tulsa, there is a compressor station that forces gas through a part of the city system, and on this site there are also buildings housing the reducing and measuring instruments.

East of the city there is a scrubbing plant where moisture is removed from the gas, and it is then measured and passed on to one of the four reducing and measuring stations located at the southeast corner of the city.

The grounds around each of these stations are landscaped and trees and shrubs planted and the attendants take much pride in keeping their station in a neat, orderly condition at all times.

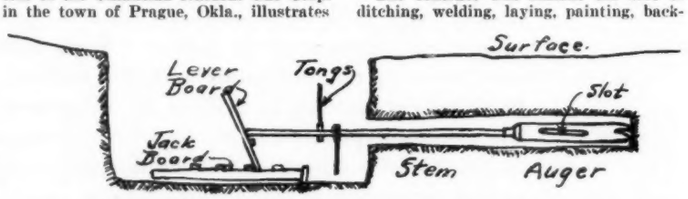
Cost System Followed in This Work

In piping a town for gas it is the usual practice of the gas companies to contract all of the work to pipe line contractors who have equipment and organizations specially got together to carry on such operations. The gas company will furnish all pipe, fittings, regulators, meters, curb boxes, etc., but the contractor must haul and string the pipe and fittings.

The contract will include the cost of ditching, welding, laying, painting, backfilling and dressing the surface and will run approximately from 25 to 29 cents per foot for 2-inch pipe; 26 to 30 cents for 3-inch; 28 to 32 cents for 4-inch; 30 to 35 cents for 6-inch and 40 to 45 cents for 8-inch.

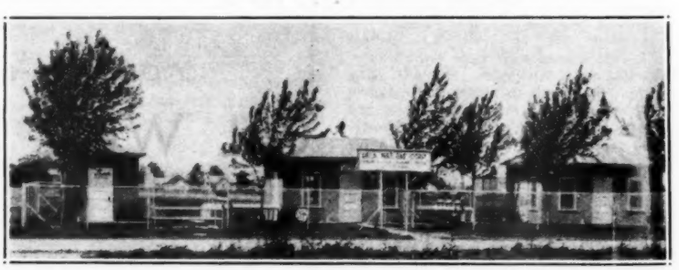
Service nipples from three-quarters to

(Continued on Page 106)



General arrangement of auger and accessories for boring hole under pavement, etc., for underground pipes.

Kennedy compressor station, Oklahoma Natural Gas Corp., north of Tulsa.



Dawson reducing and measuring station of the Oklahoma Natural Gas Corp., part of the Tulsa gas system.

Drilling Practices in the Mid-Continent

Surface Conditions Range From Low, Swampy Marsh Areas to Agricultural Lands, Deserts, Plains, Hills and Mountains

By B. M. Nowery
United Gas Public Service Co., Houston, Tex.*

In the preparation of this contribution to the drilling symposium, we have endeavored to be as brief as possible when dealing with subjects and methods already familiar to operators in the East and West, and to discuss more at length points peculiar to the Mid-Continent.

We have a variety of surface conditions in the Mid-Continent Field, ranging from low, swampy, marsh lands to agricultural lands, deserts, plains, hills and mountains. In some locations the surface is covered by water from 1 to 20 feet in depth. The surface conditions of the hilly and mountainous country resemble the fields of the East and West which are familiar to most of the operators and need no introduction here at this time. The swampy, marsh lands and areas covered by water require a different method in the drilling of wells. In the preparation for the drilling of a well in the swampy lands, we first have to build a mat on which to erect the derrick and other drilling machinery. Where the location of a well is submerged, the foundation for the derrick and machinery rests on piling which is driven into the earth to a depth that will support the weight of the derrick and other machinery. In most areas water for drilling purposes is found in abundance in shallow sands, but in certain arid regions water is very scarce and it is often necessary to lay several miles of water line to the nearest source of supply. Natural gas is the usual fuel where drilling is carried on in the vicinity of gas transmission lines or in proven or partially developed areas. Fuel oil is the principal fuel when wildcatting, although coal and wood are sometimes used, in spite of their cost. The transportation of oil, coal or wood, to the location usually is a problem, solved by trucks on dry ground and barges in the submerged areas.

Producing Areas and Formations

Gas and oil production is found in numerous types and sizes of reservoirs. The formations comprising these reservoirs are sand, limestone, chalk or volcanic ash, and vary in thickness from 5 to 100 feet. These reservoirs or producing formations are variable in area, the larger fields being found in North Texas, Kansas and northeast Louisiana, with a predominance of small domes in the southwestern part of the Mid-Continent area. Production is also found in scattered domes in the northern portion. The formations encountered in the northern portion of the Mid-Continent area are older and naturally will stand up better while drilling than the softer formations found in the south and west portion. Profitable production in the Mid-Continent area is found at depths ranging from 800 to 8,500 feet. Some fields have produced from as many as three to five sands, these separate horizons being reached by deepening the same well, or wells, from one horizon to the next as each formation is depleted.

Drilling Procedure and Improvements

Both cable and rotary tools are used in drilling in the various fields of the Mid-Continent area. The prevalence of softer formations in the southern and western portion calls for rotary equipment, while the harder formations of the northern portion allow the use of cable tool equipment. In some areas it is economical to use both rotary and cable tools in drilling the same well, because of the variance in formations sometimes encountered in certain fields. As cable tool drilling in the Mid-Continent area varies little from the practice in the East and West, it will not be taken up in this discussion.

Rotary drilling is increasing in favor due to many improvements in the equipment used. It is now possible to drill through almost any formation with this method. Rotary drilling is much faster and can be done with a smaller hole than cable tool methods, resulting in a marked saving in time and casing.

Some of the recent improvements which have stimulated the use of rotary equipment include drill pipe with tool joints, roller or rock bits, core barrels, wall scrapers and weight indicators. The roller bits, or rock bits, have made possible the drilling of rock and other hard formations. The late model core barrel will take a core of any formation without much expense, and in some instances will drill hard formations cheaper than any other type of bit.

Wall Scrapers Valuable

Underreamers or "wall scrapers" prove valuable in deepening holes and cleaning out below the seat of the casing already set. Often the largest bit which can be introduced through the present casing will not drill a hole large enough to permit setting of casing much larger than a good sized string of tubing. This "wall scraper" is then used after deepening with the regular bit to enlarge the new hole to any desired size. After this has been done, the only limit to the size of the new string is the maximum coupling which will pass through the original string. This same "wall scraper" can be used to ream out cement when a well has been plugged back too far. This "wall scraper" is a simple device having chrome vanadium steel blades which withdraw into the body of the tool while running in and out and are expanded by hydraulic pressure when the point where reaming is to start is reached. This hydraulic pressure is secured from the circulating fluid which acts on a piston in the top of the tool to open the blades. When the pressure is removed, a coiled spring returns the blades to the closed position. This "wall scraper" is inserted between the end of the drill pipe and a diamond point or fish tail bit.

The weight indicator is an important development which shows the trend towards the application of scientific principles to well drilling. This device shows the driller at all times what weight is being carried on the drill bit or core barrel, and also indicates the stress placed on the drill pipe while pulling "frozen" or stuck drill pipe, and setting or pulling casing. This indicator is also a recording device, whose chart serves as a check on the actions of the drilling crews while on tour.

Water Flows and Caving Formations

In the drilling of wells in some fields of the Mid-Continent area, artesian water flows and caving formations are encountered. To overcome such caving and water flows, a number of compounds, known as mud weights, are used with the regular heavy drilling mud. This weighted mud tends to wall up the hole while drilling and prevents any caving or water flows. This mud also protects, by its weight, against any blowouts which might occur due to drilling into an unexpected gas sand.

Even with heavy drilling mud, high gas pressures at unexpected levels are encountered which cannot be controlled and blowouts result. Usually the case is not in the hole and it is impossible to cap the hole and a wild well results, which soon develops into a "crater." These wells are called "craters" because of the resemblance of the top of the hole to a volcanic crater. These "craters" have been considered beyond control in the past and have resulted in rapid depletion and sometimes ruination of the producing formation. A method has been developed in Louisiana which appears to be practical for "killing" such "craters." Two or three wells are drilled with the utmost precaution as near to the "crater" as possible, one being placed on one side of the hole and the other one or two diametrically opposite with the "crater" as the center. The one well is equipped for either blowing to the air or for pumping of clear water into it. The other two are equipped to be blown into the air. A water hose is provided of sufficient length to allow water to be poured into the crater from any side. All three wells are blown to the air until the pressure of the producing sand in the vicinity of the crater has been materially reduced and at the same time the water hose is used continually, washing mud and sand from the surrounding terrain into the surface cavity of the "crater." Blowing of the three wells creates channels in the producing sand which will allow easy and rapid flow of the water later to be pumped in.

Lone Well Then Closed In

The lone well is then closed in and clear water pumped into it as rapidly as possible. This water, upon reaching the gas formation, will move along the channels already formed, following the gas which is being withdrawn through the remaining two wells. These channels will lead the water directly under the "crater," where it will be drawn up into the crater hole by the gas which is escaping through it. In most cases, this procedure, if uninterrupted, will reduce the pressure in the sand and introduce sufficient water into the bottom of the crater hole, as well as mud into the top, to cause a sudden and permanent stoppage of gas flow from the "crater." The theory in this method is that the blowing of the wells to the air at first will reduce the formation pressure and cut channels so that the clear water pumped into one of the wells will be drawn by the gas movement within the formation along a path which is intersected by the hole of the "crater."

In one particular case where this method was employed, the original well cratered at about 900 pounds rock pressure with an estimated volume of 60,000,000 cubic feet. All the offset wells were rushed to completion and then blown for about four weeks. Water was then pumped down one of them for about two weeks with the other two still blowing when the crater suddenly stopped flowing gas and was pronounced "dead." During this interval of time, the formation pressure in the immediate vicinity dropped less than 200 pounds, reaching a value of approximately 710 pounds. Wells a mile or more distant showed declines in pressure of only 15 to 30 pounds. If this "crater" had not been controlled,

(Continued on Page 100)

*Before convention Natural Gas Department American Gas Association, Memphis, Tenn., May 11-14.

MULTIPLICITY OF SANDS IN SAXET FIELD ATTRACTIVE TO OPERATORS

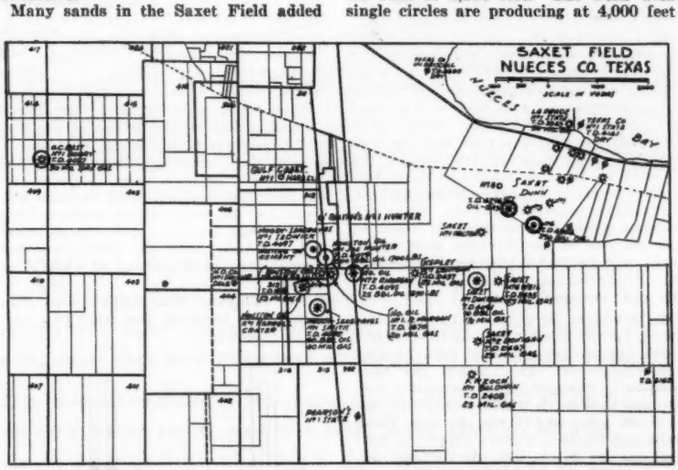
By B. D. Stevenson

SAN ANTONIO, Tex., May 9.—Multiplicity of sands that have been proven in the Saxet Field west of Corpus Christi in Nueces County is attracting attention to the potentiality of that whole district. There are six sands now producing in the district and there are two other sands logged in deep wells that are probably productive.

Many sands in the Saxet Field added to the fact that there are many producing in the Refugio Field 40 miles north and more than one sand in the Kingsville Field 40 miles south and at least two sands in the Agua Dulce Field on the west, leads naturally to the conclusion that fields yet to be discovered in that coast country will have many sands.

On the map herewith the gas wells immediately south of Nueces Bay are producing from three sands, the deepest being the LaPrade well at 2,563 feet. There is one sand at 2,400 feet and another at 2,300 feet.

The two tests with double circles are oil wells at 4,300 feet. The wells with single circles are producing at 4,000 feet with the O. C. Best well 4½ miles west of No. 1 Donigan of the Saxet Oil Co. Two tests in the middle of the map enclosed in one circle are shallow gas wells and tests that drilled deep and plugged back logged at least two other sands that is probably productive. In connection with other coast fields the Saxet area presents an interesting study.



East Uses Unique Production Methods

Various Means of Recovering Natural Gas Have Originated There as a Result of Problems Different From All Others

By Samuel W. Meals
President Carnegie Natural Gas Co.*

The natural gas industry in the eastern fields is unique in many ways and requires production methods which are different from any other field in the world. The eastern fields have been the birthplace of production methods since oil was discovered in August, 1859, in the flats below Titusville, Pa. For many year, when natural gas was found during the search for oil, it was considered a nuisance and many large wells blew into the air. The value of natural gas as the active agency of moving oil toward a well was not realized until many years had passed and oil pools rapidly declined in production because natural gas had escaped.

The first use of natural gas in Pennsylvania on a commercial scale as a public utility was in Titusville in 1872. The gas was piped 5½ miles and supplied 250 customers with fuel and light. The first successful utilization of natural gas in an industry was in the iron foundry of Rogers and Birchfield at Leechburg, near Pittsburgh, in 1874. Gas was piped from a well close to the factory. In 1875 a 6-inch line was laid 19 miles to Sharpsburg and Millvale where the gas was utilized in iron mills. In 1878 an enormous gas well was found at Murrysville, near Pittsburgh. It blew open for years, and called attention to the unused natural gas resources which lay near a large manufacturing center.

In 1883 several projects were under way to pipe natural gas from this field to Pittsburgh, and in 1884 natural gas was used extensively in the industries of that area; but natural gas went to waste for years in the more remote country districts.

Gas Flares Common Sight

As late as 1905, a traveler through West Virginia and Pennsylvania could see dozens of gas flares along the countryside at night. It was common practice to run up a length of pipe, turn a tub or bucket over the top and ignite the gas. The gas would burn for months or even years. It was not until war time that a rather complete system of gathering lines reached all of the gas pools and their gas was transported to consuming centers. For 25 years, steel mills, iron foundries, glass factories and other industrial plants relied solely upon natural gas for fuel. Reserves began to fail and adequate means were not taken to conserve and equalize production, with the inevitable result that some industrials turned to more expensive and less desirable manufactured gas. From 1883 to 1910 natural gas was primarily an industrial fuel.

After 1910 a general transition took place as the reserves of natural gas were depleted, and prices rose in sympathy. Enough gas to meet factory needs and peak periods of industrials could not be adequately supplied. Producing companies turned to the domestic consumer in an effort to secure a more suitable market, and many manufacturers went back to the use of coal, or substituted manufactured gas. Distributing companies found that a domestic market without industrial sales was not good business. In the meantime producing companies had inaugurated a successful drilling campaign which had enlarged the reserves of natural gas. The tables turned and again gas companies were seeking industrial loads to balance some of the inequalities in a purely domestic demand.

Original Pools Depleted

While these transitions were taking place, many of the original gas pools had been depleted; many others were on vacuum and the pools which were being discovered were small and the wells in them were also small. In order to produce natural gas at a profit it was necessary to develop a technique of care and conservation of many small wells. This technique is peculiar to the eastern district and is a direct outgrowth of certain characteristics of the field. In the Mid-Continent and California fields the gas sands are usually thick and more or less consolidated; wells have large rock pressure and volume. In the eastern fields the sands are comparatively thin and the average porosity is less than 18 per cent.

The life of an average well is long but its initial production and rock pressure are low in comparison to other fields in the United States. The eastern operators are now "gleaning" gas from a hundred thousand old wells, some of which have been producing for 30 to 50 years. The average daily production of wells in Pennsylvania is less than 20,000 cubic feet per day; in West Virginia 40,000 cubic feet per day. In order to properly conserve these small wells, which are the backbone of the industry, it is necessary to systematically care for them, replace tubing when necessary, shoot them occasionally and keep the well as free from water as possible.

There seems to be very little new territory to be developed in the eastern fields. The question may be asked, what about the Tioga Field and other possible fields farther north in New York State? These fields are of great value but development costs will be large. The percentage of dry holes will be far greater than the average for the eastern fields and great quantities of water, which is constantly encountered in the producing sands, threatens to drown out the producing well at any time, particularly after the initial rock pressure has been reduced somewhat.

Reserve Not in New Territory

The reserve of natural gas in the eastern fields is not in new territory, but in old. Occasionally wells are found in old pools, particularly those which were drilled for oil and abandoned. Some wells of this type are found which have an initial production of over 1,000,000 cubic feet of gas per day and a rock pressure as high as the original pressure of the pool. Deepening of oil wells to other sands is often successful and in recent years has proved a new reserve of natural gas. Deep drilling to the Medina and Oriskany has not, as a rule, been successful. The reserve of natural gas in the Devonian shales of southern West Virginia appears to be large; Kentucky contains much untested territory; Ohio will develop more gas, particularly close to the outcrop of the Trenton lime. New pools will be found in New York State, but Pennsylvania has no place to turn for new development.

In the first 30 years of the industry, gas wells which produced less than 50,000 cubic feet of gas per day were plugged and abandoned. This policy has been completely changed. The companies now cap and save wells which produce as low as 5,000 cubic feet of gas per day. These wells constitute a reserve supply of natural gas for future use. As drilling continues, the percentage of small wells will become larger and larger until all of the gas in the eastern fields will come from wells which produce only a few thousand cubic feet per day. It is possible to produce gas from such small wells because gas is near to a ready market and after pipe lines have reached the eastern cities a new demand will be created. Wells which are now capped or being used only part of the year will be placed in the line and the gas sold at a profit.

Where One Well Has Several Gas Sands

Gas is produced from 50 horizons in 6,000 feet of strata in the eastern fields. Rarely, however, do more than three horizons produce gas in the same locality. Few wells must be equipped for multiple gas production. If gas is found at a shallow depth it is packed off and a line of smaller diameter pipe is run to the next gas-producing horizon. It is regular practice to set the packer above and closer to the top of the producing sand, thus all the gas in the producing sands is thrown together.

There are instances when tubing must be run to the bottom of the hole to protect the deeper producing sands from well cavings. In this case tubing is run to the bottom of the hole in two or three sections with a joint or two perforated at each point or horizon which is producing gas. Combination wall or anchor packers are used for this purpose. Much trouble has been experienced when settling of the packer causes the tubing to settle. The packer slips, which usually results in a leak.

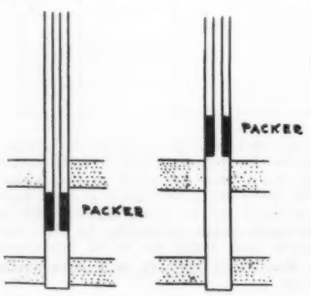
Rock pressures in different sands vary; usually, the deeper the sand the higher the rock pressure, but this is not the constant rule. In a well which produces gas from a deep sand and also from a shallow sand, it is not unusual for the gas from the deep sand which has higher rock pressure than the shallow sand gas to feed it back into the shallow sand. In order to prevent this back-feeding it is necessary to separate the gas. Usually a packer is set below the upper producing horizon and the gas from this horizon is shut in on the casing. A bradenhead, or casinghead, is installed in the top of the well.

Production Is Flexible

This method of production is particularly valuable when there is a low-pressure and a high-pressure line to the well. The shallow gas, which is usually low-pressure gas, is turned into the low-pressure line and the deep gas with high rock pressure is turned into the high-pressure line. The production of the well is entirely flexible because production from either horizon can be governed at the well. One disadvantage of this method of production cannot be overcome. If the upper gas sand makes water or a leak develops in the casing there is no means of bailing the well.

Some companies are now running a measuring line to the bottom of the hole and after determining if any cavings are present they are cleaned out through the tubing and the pipe is set on solid bottom. Gas is then produced through perforations. In wells which produce from one or more horizons with almost equal rock pressure, gas is often produced through the same string of casing or tubing.

The following illustrations show two methods of handling gas from two producing horizons:



Few wells in the eastern district are now producing both oil and gas from the same horizon. In these old fields the pressure in the oil sands has been so reduced that only occasional wells flow for short periods after they are drilled in. In some fields casinghead gas is wasted because it is not profitable to recover it. The usual method of separating oil and gas from the same well and within the well before either oil or gas is brought to the surface is to drill a pocket or sump 25 to 100 feet deep below the producing sand. Oil which comes from the gas sand settles into the reservoir and is bailed out.

The length of the pocket or reservoir which is necessary to keep the well clear is determined by the quantity of oil which is produced and the frequency of the removal. Oil can be removed from the pocket by first pumping the fluid out of the well by means of an additional string or length of pipe, which is usually 1½ to 2 inches in diameter. A working barrel is attached to the lower end of the pipe for the location of the necessary valves which are attached to the string of rods which in turn operates the valves. This operation lifts the fluid from the pocket through the tubing to the surface. The oil is piped directly to a tank.

The bailing method consists of opening up the well and letting the gas escape into the air while a bailer of small diameter is let down into the bottom of the hole by means of a wire line controlled from the surface by a bailing machine.

Separating Tanks Used

The conventional method of separating oil and gas after it has been raised to the surface is by means of various makes of separating tanks which are now on the market. These tanks are required only when the quantity of oil is considerable and where it is not being delivered directly to the surface by the volume of gas from the well. In this case separation in the well is not possible. It is necessary to install a drip for the separation of small quantities of oil, which sometimes occur in the gas well in the eastern fields, particularly from condensation from gas.

The type of drip and its size depend upon the quantity of gas which is to be handled and the quantity of oil to be recovered or taken from the gas. These drips are usually designed and built by the operators to take care of individual wells. The gas is made to enter a large diameter pipe near the well, which may be from 20 to 100 feet in length. At either end of this run of pipe, which is larger than the diameter of the pipe leading from the well, there is attached an angle of the same size pipe, to which is attached another angle that separates the fluid from the gas by the result of expansion or slowing up of the flow when the gas enters the larger size pipe. The line which delivers the gas from the well to the main or gathering line is connected from the top or upper side of the angle, and continues in the same diameter as the line which leads from the well to the drip.

Salting and Freezing of Wells

In many of the old gas fields in Pennsylvania, particularly in Butler County, and in some localities in Kentucky, West Virginia, Ohio and New York salt water is gradually encroaching upon the wells and flows out with the gas. These brines gradually crystallize on the face of the sand and are carried into the tubing and cause salt arches. The most common method of cleaning wells which are salted up is to run a barrel or two of fresh water into the well and allow it to stand for a few hours. After the salt bridge is

(Continued on Page 98)

*Before convention Natural Gas Department, American Gas Association, Memphis, Tenn., May 11-14.

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Testing Large Positive Meters in Field

Three Methods Offered, All Accurate When Used Under Proper Conditions, and Choice Depends on Requirements of Case

By John C. Diehl
Metric Metal Works, Erie, Pa.*

High-pressure large capacity meters are usually located at a considerable distance from the repair shop, or where the cost of installing or removal is high. Frequently they are installed at wells remote from a main traveled highway, or in relatively inaccessible places in industries. Since they are heavy and hard to handle, it is difficult and expensive for the company to remove them for testing and calibration. It has become desirable to develop methods for accurately testing these meters in place.

The improvements made in the methods of testing large meters in the field have been developed to meet the following requirements: (1) Accuracy, (2) full capacity range of meters, (3) reduction of possibility of observational errors, (4) reduction of field calculations, (5) simplified routine procedure, (6) portability of apparatus, (7) ease of installation, (8) elimination of shop testing.

The field testing methods generally used may be classified under the headings: (1) Portable test meter method, (2) low-pressure flow prover method, (3) critical flow prover method.

Test Meter Method

The equipment usually consists of a tinned steel case or an aluminum meter, a differential or U-tube gauge, two thermometers, necessary fittings and hose for connecting the test meter to a fitting on the outlet of the field meter. In some cases commercial meters of the same capacity as the field meters are used as test meters. Some companies use a special truck or trailer for transporting the test meter from the shop to the location of the field meter.

The differential gauge or U-gauge is used to determine the difference between the pressure at the inlet of the field meter and the pressure at the inlet of the test meter. The thermometers are used to indicate the temperatures of the gas as it passes through each meter.

The test meter is correctly adjusted in the shop, taken to the location, and connected by a short hose in series with the field meter. When necessary, the outlet of the test meter is connected to the line so that gas may not be wasted. Eliminate all leaks between the inlet of the field meter and the outlet of the test meter.

The field meter is tested at a low rate and at the maximum rate by controlling the rate of flow by means of a valve on the upstream side of the field meter. The simultaneous readings of the proving hands of the meters during the check-rate and open-rate tests are noted.

The information required follows: (1) Reading of the field meter, (2) reading of the test meter, (3) temperature of gas at field meter, (4) temperature of gas at test meter, (5) difference between the pressures at the inlets of the meters, (6) check-rate proof of test meter, (7) open-rate proof of test meter.

Obtained in the Field

All of the information required for calculations of the proofs of the field meter are obtained in the field with the exception of the proof of the test meter.

The accuracy of the test meter method depends upon the proof of the test meter, which is usually tested with a prover prior to use and after use. The test meter should be handled carefully so that the proof will not be changed during transportation. Furthermore, the test meter should be tested at a maximum rate such that the differential, that is, the difference in pressure between the inlet and outlet of the meter when tested in the shop, is equal to or greater than the differential which is produced by the maximum rate when used for testing in the field. Needless to say, the test meters should be tested frequently to be sure that the proof is correct and has not been changed due to transportation, handling or excessive loads.

The size of the test meter should be at least equal to the size of the field meter or a sufficient number of test meters should be connected in parallel and the parallel installation connected in series with the field meter so that it can be tested at the maximum differential produced by the flow of gas when in service.

For example, if a field meter is used at an index rate of 8,000 cubic feet an hour to measure gas at a pressure of 20 pounds, this meter should be tested with the gas at atmospheric pressure, at a rate of 12,000 cubic feet an hour.

Two Test Meters Needed

If the maximum rate at which the largest test meters are adjusted with the prover is 5,000 cubic feet of air an hour (which is equal to a rate of $5{,}000 + \sqrt{G}$ in cubic feet of gas an hour), two test meters are required to test the field meter at a rate of 12,000 cubic feet an hour. Therefore, when testing meters used under high pressure and the test meter is not satisfactory for high pressure, it is frequently necessary to use a meter larger than the field meter or a number of test meters to test a field meter accurately at low pressure.

Simultaneous readings of the dials of the meters are obtained, the dial reading on the field meter and the dial reading of the test meter or meters for each test rate. Therefore, in order to reduce the observational error, the difference between the readings at the beginning and at the end of a test should be at least equal to 5 and preferably 10 full circle readings of the proving hand having the smaller full circle reading. The difference in pressure between the inlet of the field meter and the inlet of the test meter should be noted, as each inch of water differential produces a difference of approximately one-fourth of 1 per cent when the test is made at low pressure.

Care Necessary

Great care should be exercised in regard to temperature. Test meters should be connected as closely as possible to the meters being tested. If the field meter is set on the ground and the temperatures of the atmosphere and the ground are different from the temperature of the gas, it may become very difficult to determine the temperature of the gas at low rates, as the temperature of the gas will be affected by the rate of the heat transfer through the case.

Before the test, the gas should be passed through both meters until the temperatures at the inlets of the meters are the same as the temperatures at the outlets, or until there is a constant difference. Each degree of difference between the temperatures of the gas in the two meters produces a difference of one-fifth of 1 per cent. Therefore, it is necessary to compare the indications of the thermometers with one another to be sure that they agree.

The field meters can be tested under high pressure by this method, but especial care and extensive calculations are required if the test meter is used at low pressure. If the field meter is under high pressure and a valve is used between the field meter and the test meter, considerable care must be used to be sure that the differences between the temperatures at the inlet of the field meter and the inlet of the test meter are constant, as this may vary on account of expansion through the valve.

Low-Pressure Flow Prover Method

The general type of low-pressure flow prover or funnel meter has been used for many years to test field meters in location. A low-pressure prover may be made in the form of a small orifice meter in which the straight pipe on the upstream side of the orifice is 8 to 10 pipe diameters long and the straight pipe on the downstream side of the orifice is 10 pipe diameters long. When the gas can be wasted, the outlet of the prover is open to the atmosphere.

The apparatus, which consists of two pieces of aluminum pipe, a set of straightening vanes in the upstream section of pipe, special flanges equipped with hook bolts and thumb screws, six orifice discs for six different rates, a differential gauge or U-gauge, stop watch and thermometer weighs 13 pounds. When it is furnished in a special carrying case, the weight is 38 pounds. It is desirable to include an aneroid barometer with the equipment.

Each of the orifices is marked on the outlet side with the standard time of the orifice. This standard time is the time in seconds required for the passage of 1 cubic foot of air (at the upstream pressure) when the absolute pressure at eight pipe diameters downstream from the orifice is 29.0 inches of mercury absolute, the differential across the orifice is 8.00 inches of water, and the temperature is 60° F.

The correct time for the passage of 1 cubic foot of gas at the upstream pressure when the pressure, the differential, the specific gravity and the temperature differ from the abritrary values given in this paragraph is obtained by multiplying the standard time by the factors given in the accompanying tables.

Placing the Orifices

The orifices are placed in the flow prover with a gasket on the inlet side. The side of the orifice which is stamped with the standard time is the outlet side. For the purpose of indicating the differential across the orifice, it is advisable to use a differential gauge or U-tube in which one column is many times the area of the other column.

The stop watch is used to obtain the time required for the passage of gas for one or more complete revolutions of the proving hand of the index. The test time should not be less than 100 seconds.

The prover is attached to the meter or to a connection close to the outlet of the meter between the meter and a gate valve on the downstream side of the meter. A small orifice is placed between the flanges for the check-rate test and one column of the differential gauge is attached to a connection on the upstream side of the orifice. The valve on the upstream side of the field meter is adjusted so that the reading of the differential gauge is constant and between 5 and 10 inches. Note the reading of the differential gauge, and the time required for the increase in index reading, the temperature at the outlet of the prover, the barometric pressure, and, if necessary, the pressure at a point eight diameters downstream from the orifice.

Getting the Differential

When the outlet of the prover is at-
(Continued on Page 97)

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SURFACE CONDITIONS IMPORTANT IN SELECTING DRILLING SITE IN EAST

By J. French Robinson
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Present day drilling methods, factors governing the need of special equipment, and general conditions existing in the eastern division are briefly discussed in this paper.

Although the geological structure is of prime consideration, surface conditions also play an important part in regard to selection of a drilling site. Fuel and water are accessible over practically the entire Eastern Field and railroads, and hard surface roads provide good transportation facilities.

In the eastern division, consisting of the states of New York, western Pennsylvania, eastern Ohio, West Virginia, Kentucky and Tennessee, the subsoil is generally clay or firm gravel. With such surface conditions, drilling may be started with regular tools—24 inches to 10 inches in diameter—and continued for 30 or 40 feet using only wooden conductor to prevent caving. In northern Pennsylvania and southern New York, however, glacial gravel deposits are present which require extra precaution. Frequently drive clamps are used to drive casing—the inside diameter of which is the same size as the hole drilled. The drive clamps are attached to the square of the stem to do the driving. Drive heads are screwed on top of the casing to protect the threads or coupling.

Nature of Producing Area

The Appalachian oil and gas field lies in a geosyncline or bowl-shaped structure, west of the Allegheny front, and extends from New York State to Alabama. The strata are so folded as to resemble an oblong bowl, the major axis of which extends in a general northeast and southwest direction. The center of the geosyncline is located near Wileyville, Wetzel County, West Virginia, a few miles from the Pennsylvania State line. This is the lowest point structurally in the Appalachian Field. The Pittsburgh coal has an elevation of zero (based on sea level) at this point. The various strata rise in all directions from the low point, but are disturbed in some places by other foldings upon the major fold, which cause the strata to resemble a wave. All of our known producing horizons outcrop in central Pennsylvania. The rise to the north is gradual, with the Gordon sand outcropping at Salamanca, N. Y.

Formations in the Appalachian Field consist principally of shales, coals, limestone, conglomerates and sandstones. The strata vary in character, hence a section taken at one place may differ materially from that taken at another. Certain persistent and well recognized strata, however, may be used to correlate one section with another.

Producing Formations

Production of oil and gas in the Appalachian Field is obtained from 41 different horizons and at varying places on the geologic structure.

Major producing formations in order of their location in the eastern division are:

New York—Bradford sand, Corniferous limestone, Guelph limestone, Oris-

(Continued on Page 105)

*Before convention, Natural Gas Department, American Gas Association, Memphis, Tenn., May 11-14.

Gas Production in Mid-Continent Area

Usually Better to Exhaust Each Sand in Turn Than to Attempt Production From Two or More Sands in Same Well at One Time

By Ross M. Stuntz
Cities Service Gas Co., Bartlesville, Okla.*

It is difficult to discuss gas production without discussing gas drilling. Any paper on gas production must start out with the assumption that the wells from which this gas is going to be produced have been drilled properly. The drilling of gas wells is often very successfully handled by a different organization than the one who handles the production of gas from the well. This is only possible either where both organizations are expert in that line of work or where one of them is expert and there exists a thorough cooperation between the two. As a rule the organization drilling a gas well is done with it when it is completed, while the gas production man starts there and must live with the well during its entire producing life to its abandonment.

Speaking generally, in the Mid-Continent area, if a gas sand is not worth a well for that particular sand, no other wells, after the first test, ought to be drilled. It is generally better, at least after the first test well, to drill down to the shallow sand and produce it to exhaustion, then carry the well down to the next sand and so on until all the sands have been exhausted. In some cases it is desirable to save gas in a bradenhead for fuel purposes or for securing such revenue as may be possible from bradenheaded gas production in a shallow sand.

No Bleeder Lines Possible

In case it is desired to bradenhead gas in any sand it is desirable to set one string of casing on top of the sand and set the next string of casing just below the gas sand. In this way the gas in the shallow sand must come up between the two strings of casing and be taken out of the bradenhead on top of the hole. The chief objection to producing gas in this manner is that due to the very small space between two such strings of pipe no bleeder lines are possible and no remedial work on the bradenhead gas producing horizon is possible. Therefore, in bradenheading gas one usually spends an additional string of pipe and lives in the hope of getting gas enough from such sands to make the additional investment profitable. Sometimes it is highly desirable to follow such a method in order to secure fuel for other drilling operations, and thus save the purchase of fuel. It is my experience that most pipe line companies put very little value on bradenheaded gas and often refuse to spend the money necessary to connect same to their pipe lines.

After the shallow sand has been cased in the manner mentioned it is possible to carry the hole further. When producing from a deeper sand, in general the practice is to set the second string of pipe on top of the second gas sand. This often leaves a great deal of open hole between the first string of pipe on top of the shallow gas sand and the second string of pipe on top of the deep gas sand. If any caves or water bearing formations are in this space between the two casing seats the gas bradenheaded is quite sure to be of very short life and the shallow sand in that field is often flooded.

I have known of very few cases where gas from more than one sand was successfully produced in the same well at the same time. Sometimes it is desirable to carefully mud off the shallow sands and produce them after the deep sand has been exhausted.

Separating Oil and Gas

As large amounts as 50 bbls. a day of oil have been successfully separated from natural gas in drips located in the lines between the producing well and the main gathering line for natural gas. In connecting up any gas well one or more drips should be installed before the gas enters the main field line. These serve to catch small amounts of fresh water, salt water, or gasoline, and most gas wells produce some one or more of these fluids. Unless a well is showing considerable amounts of fluid when it is connected it is our company's practice to start out with the installation of such drips, usually with one drip on the inlet of the meter for the particular well in question.

If a well is producing considerable oil to begin with when drilled in, the amount that it will produce when a considerable back pressure is held on the well, such as would be necessary to make it feed into the pipe line, generally holds back a large part of the fluid and much less oil is produced with the gas than one would expect had he seen the well when it was drilled in. You will probably be surprised at the small amount of fluid that will be produced, under these conditions. If the well produces more fluid than this drip will handle efficiently it is our practice to recommend that the producer install a separator of suitable size and design to meet the conditions of the particular case in question. In fields where fluid is expected to increase, these connections are put in on the downstream side of the cutting device or flow bean before the gas enters into the drip on the inlet side of the meter. These connections at the time of installation consist of a meter flange, on each side of which a threaded nipple is welded into the pipe and then closed with flange unions or with collars and bull plugs.

Blind Disc Put in

After the separator has been installed a blind disc is put in the meter flange and the gas goes from the downstream side of the flow bean into the separator and returns from the separator on the downstream side of the blinded meter flange. This still leaves the drip originally installed on the inlet of the meter as an additional place to catch fluid that might be pulled through the trap, or as a place to determine whether or not the trap or separator is taking out all the fluid in the gas.

In the case of any high-pressure wells producing both oil and gas a separator and sometimes several separators, connected in series, are set up, through which the gas passes before it goes to the meter. In such cases the flow beans, or other pressure control devices, are located directly on the well's christmas tree for the protection of the separator, and to allow separators of a safe working pressure equal to the pressure carried on the pipe line to be used.

If a well producing both oil and gas is at first producing very much oil, or believed likely to produce very much oil, a separator of satisfactory size, test, and design would better be installed right at the start. This is often greatly in the interest of the producer for two reasons:

1. He is sure to get all the oil out of the gas.
2. He is sure to deliver dry gas to the purchasing pipe line company.

There are several well-known kinds of separators available in every field that have been adequately proven to do this kind of work.

Salting of Wells

I have not had experience with many wells being troubled from salt while they were large wells or while they had high pressures. I have known a few cases where bleeder lines in which a perforated joint, or part of a joint, was placed on the bottom of the hole salted up. Such salting can be deferred for a considerable time by cutting slots with a cutting torch for perforation instead of drilling small holes.

In some fields when wells have declined considerably in pressure and volume both tubing and bleeder line salt up badly. Small amounts of fresh water put in such wells by a lubricator, after having been allowed to stand shut in for a few hours, are usually cleaned up for a few days. Sometimes the introduction of fresh water in this way must be done often, and at other times only occasional doses of fresh water will be required. I have known a few cases where tubing or bleeder lines salted up so much that the salt had to be drilled out, and sometimes the tubing or bleeder line had to be pulled out of the well.

Handling Water in Wells

If water shows in a newly completed well one of three things is likely to be the case:

1. The well is badly cased.
2. It is drilled too deep.
3. It is an edge well.

As a rule pumping water from gas wells is too expensive an operation in comparison with the gas recovery. I am personally acquainted with a good many gas wells and at the present time only know one well actually delivering to a pipe line which is being pumped regularly. In this particular case the operation has been going on for two or three years and has been very profitable to the producer.

In old fields where wells would naturally be tubed or have bleeder lines in them occasional bailing is often very helpful and by the use of winches mounted on trucks is an inexpensive operation in the case of shallow wells. We have found this operation expensive in wells over 2,000 feet and generally of doubtful value.

The installation of siphon lines of proper size is worth a lot of consideration when the well is first drilled. If the area promises a well of good size it would be a safe rule to see that a bleeder line is installed on the completion of the well. Such a siphon or bleeder line would extend clear to the bottom of the hole and would have the bottom 3 to 8 feet slotted or perforated and this siphon or bleeder line connected into the pipe line in such a way that it can be operated separately from the side gate from which large amounts of gas would have to be taken. In this way fluid would be taken out of the well a little at a time as it ordinarily comes from the well and not in slugs of several barrels each as is often the case where wells are not equipped with bleeder or siphon lines. This is particularly the case where a well is finished with a larger size producing string like 8¼-inch or 9⅝-inch.

Care of Wells

The first requirement in regard to the care of wells is a frequent record on the working pressure of each well and also on its rock pressure when it is not delivering gas. Of course, the ideal way to do that is to have a recording gauge installed at each well to keep this record continuously. In many cases the installation of such recording gauges would run into an expense that is often considered prohibitive.

A well does not have to accumulate much fluid, whether it be water, gasoline, or oil until the results of this accumulation will quickly show up in a lessened working pressure if the well is feeding, or in rock pressure if the well is temporarily shut in. This is one of the quickest ways to determine the current condition of any gas well. If a well has been equipped with a siphon line the fluid can be got out quickly and with very little waste of gas through such line. If the siphon line is connected into the pipe line so that gas from it can be taken without taking gas from between the tubing and the casing the fluid can be removed and separated in the drips without waste of gas.

The handling of fluid from wells in this manner has a great bearing on uninterrupted operation of pipe lines, for the l on that fluid is drawn from the well a little at a time as it enters it and, being a very small proportion of the total volume then handled, is separated in the ordinary drips and does not enter the lines where it might later freeze the line off entirely. Without a bleeder line fluid accumulates in the well and is finally driven out in slugs which either run the drips over or goes by them altogether, according to their type of construction.

Equipping wells with bleeder lines is the means of curtailing gas waste that would otherwise be required in order to lift fluid through the casing by means of having it wide open to the atmosphere. I blew a 50,000,000 well 20 minutes through a 2-inch bleeder line—the rock pressure was 645 pounds. At the end of the 20-minute period there were 495 pounds between the tubing and the casing.

Another Important Result

Another very important result from the installation and proper operation of bleeder lines comes from the fact that the pressure at the sand face is never released and the hole is much less likely to cave, thereby filling up the well and there is little or no chance of the well being drilled deeper by the quick release of pressure as is the case when the full size of the casing is open to the atmosphere and pressure on the sand face is released. In many cases producing gas sands are not far above the water strata, and in cases of a producing gas well it is often not desirable to have any knowledge of the exact location of such water strata.

It is sometimes necessary to blow wells, but that is more often overdone and may cause great harm to the well through collapsing the casing, causing open hole to cave in, or drilling the well deeper when same is not desirable. In my judgment installation of proper bleeder lines or a siphon line early in the life of the well is of prime importance in the care of wells, in the safe and uninterrupted operation of field lines in the winter time, and it is my belief that wells whose fluid is handled promptly will have considerably greater useful life and yield of gas than those wells will have where such lines are never installed, or as often happens, where such lines are installed too late to be of greatest benefit. Of course, the ideal time to install a bleeder line is when the well is drilled. Sometimes this is impossible because of great pressures and large volumes, and because of the fire hazard entailed. We have seen the tubing process, which is now available in many fields, from the Southern States, Inc., used with remarkably good results.

High-Pressure Wells and Casingheads

Some are inclined to criticise the expenditure necessary in a master gate when a bleeder line is to be installed through it. However, in the case particularly of a large high-pressure well, the master gate could be closed when the last joint of tubing was above it while being removed for any operating reason, and the well put in control while new tubing is being made ready to start in the hole. This is sometimes essential because sizes of tubing have to be changed occasionally. Sometimes the tubing is cut out by sand in the gas, or eaten out by chemicals present in the well, or is no longer serviceable because of the action of salt water; therefore, this master gate is believed entirely justifiable in such cases. Cross tees for high-pressure

(Continued on Page 100)

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Sales Energy Needed in Gas Business

Outlook Never Brighter, but Industry Must Be Alive to Advantages of Its Service and Tell Its Story Through Advertising

By B. H. Gardner
Director of Sales, Columbia Engineering & Management Corp.*

As the natural gas business is constituted today there are two general classifications of natural gas properties, each having its own peculiar sales problems. We have communities adjacent to early natural gas fields, where natural gas once was much cheaper than at the present time. There are other sections where natural gas has recently been made available, and where it has replaced manufactured gas of relatively low B.t.u. and high price. The sales problems presented by these two conditions are quite different.

Natural gas was first produced in connection with the development of oil resources and was looked upon as a nuisance. Gradually it was piped to adjacent towns and sold. Any selling price which would pay operating costs and a return on the pipe line investment was considered adequate. The investment was small, and as a result of low price, extensive use was made of gas service. In many communities almost every customer heated the home with it. Almost every customer had a hot water heater. The majority of these hot water systems consisted of nothing more than an uninsulated range boiler, equipped with a horseshoe burner, which operated continuously. These units were sold by local plumbers at low prices. Inefficient burners were installed in coal ranges for cooking purposes. The combination of the circumstances and conditions resulted in high sales per customer. Many communities averaged 150,000 to 200,000 feet per year per domestic customer.

Gas Began to Fail

Eventually the casinghead gas began to fail; and in order to maintain an adequate supply of gas, additional fields, at greater distances, had to be developed, and the gas had to be transmitted greater distances. Wells had to be drilled for gas alone, as casinghead gas could no longer be depended upon to take care of the market. Gas could no longer be profitably disposed of on the basis of a nuisance value. The selling price had to be increased. This increase has generally been obtained in the face of public opposition, the public not understanding all of the factors entering into the situation. While gas is still actually very cheap in most of these communities, the public feels that it is high. These increased rates and the mental outlook of the customer have caused a reduction in sale.

It must be remembered that the customer has a limited spendable income, most of the income being absorbed by expenses such as rent, food, clothing, etc., leaving little for luxuries, in which class we may consider gas service for house heating. Government statistics show that for Pennsylvania the average sales per domestic and commercial customer amounted to 129,000 cubic feet in 1920, while in 1928 it had decreased to 86,000 cubic feet. Statistics for Ohio show that sales per domestic and commercial customer amounted to 104,000 cubic feet in 1920, while in 1928 such sales had decreased to 75,000 cubic feet.

Of course some of this decrease in use has been brought about by the changes in our methods of living. The average family is not as large today as in times past, and the smaller average family is doing less cooking at home and is eating more meals away. Less bread and meat are being eaten; more fruits and vegetables, requiring little or no cooking, are being used, as are prepared cereals, canned goods, etc. All of these factors have had some effect in decreasing domestic gas consumption, but in the older natural gas regions the decrease has been largely due to the smaller amount of gas used for house heating purposes.

Period of Inadequate Service

There was a period during the transition from lower to higher rates when the service was inadequate, and domestic customers were not always certain of a satisfactory supply of gas during the winter months. Thus, increasing rates with inadequate service, resulted in the loss of a large part of the house heating business served by these older companies. There has not been much loss in water heating load, and there is still a high degree of saturation of water heaters in most of these communities. There has as yet been little loss in cooking load due to the question of rates, as a customer can afford to pay much higher rates for cooking than any that have been established so far. The electric industry, however, is actively promoting electric cooking and there is a danger that some cooking load will be lost to electricity, unless the gas industry is alive to the situation and takes aggressive steps to protect this load.

It would seem that not much additional domestic cooking load can be obtained in these old gas consuming areas although advertising and aggressive sales methods are justified. It can be recommended that publicity be devoted to gas for cooking. The gas industry must popularize gas as the ideal fuel. Home service departments can do good in inducing a greater amount of cooking in the home, but it is expecting too much to look forward to being able to persuade any majority of American women to forego the benefits of mass production. The average woman will never again be willing to do all of her own cooking so long as bread, pastry, salads, meats, canned goods, prepared cereals, etc., can be so conveniently obtained from the baker, the grocer and the delicatessen. Generally speaking almost all domestic customers in territories of this class have some type of gas heater which is providing a reasonably satisfactory supply of hot water, and, in general, there is little prospect of building much additional load through the sale of gas water heaters.

Modern Water Heaters Must Be Pushed

It seems, however, that it is quite essential that modern and efficient automatic water heaters be pushed, so as to protect the existing water heating load from competition with other fuels. Already, some of the larger water heating installations, in small hotels, apartment houses, etc., have been lost to coal fired water heaters using automatic stoker equipment. There is a possibility of building some additional load through the newer uses of gas, such as refrigeration, incineration, clothes dryers and ironers. Most of this equipment, however, produces a very small consumption, due to high efficiency, or short, intermittent use. None of this equipment, except refrigeration, has any general customer acceptance at this time, so that the sales resistance is high and the development of this business will be slow and expensive.

We have seen that in the class of territory under discussion, the loss in house heating has brought about the greatest reduction in domestic sales per customer and it follows that the greatest opportunity for building domestic load in these communities is through the medium of house heating sales. Most of the companies in these territories are actively promoting the sale of house heating. For these companies, it seems essential that a great deal of advertising be done on the subject of house heating to attracting new business and to protect existing business. This advertising should be accompanied by an active sales program.

In these older natural gas regions there is, generally speaking, not much opportunity of building additional commercial load. Most of the hotels, restaurants, bakeries, etc., are using natural gas for practically all purposes. This commercial load is, of course, most desirable and helps to improve load factors. Every attention should be paid to this load to see that existing installations are held and that new installations are obtained wherever possible.

Losses in Industrial Load

When we come to the industrial load in these older sections we find, that due to rising prices and the uncertain service of years ago, much of this load has been lost to oil, coal and producer gas competition. In these sections, as a rule, coal is cheap, so that producer gas plants are a serious competitor for natural gas. Of course industrial load is most desirable, has a high load factor and desirable diversity factor. Every effort should be made to take on all the industrial business which can possibly be obtained at remunerative rates.

Now let us consider the second class of natural gas properties, those where natural gas has only recently become available, and where a high B.t.u. gas is replacing a low B.t.u., high priced gas. Here the outlook for increased sales is different from the older natural gas properties we have been discussing.

In the first place, the mental outlook of the people is different and much more favorable to a rapid development of the business. In the older natural gas communities, as has been pointed out, the thought of the people has been that gas service is very expensive. In these newer communities, the thought is generally that gas service is much cheaper than ever before, and that the customer can now utilize gas service for many uses that he formerly felt he could not afford. This attitude makes it possible to build new gas load much more rapidly.

Furthermore, these newer communities offer a more fertile field for the introduction of many kinds of appliances. This is profitable business and it should be pushed. Customers who have used gas for cooking purposes only during the summer months should be persuaded to use gas for all cooking operations throughout the 12 months. Due to previous relatively high cost of operation a relatively small number of water heaters are in use. The gas company should promote the sale of automatic water heaters. With the lower cost of operation, due to natural gas, a high saturation of these heaters should be obtained and little trouble should be experienced in securing this business on a 12 months' basis. This water heating load is one of the most desirable domestic loads, having a splendid load and diversity factor.

Little House Heating Business

In most of the communities where natural gas has just become available, there is almost no house heating business, and a large increase in such sales should be possible. Every gas company should promote this business aggressively. At the expiration of a few years, the cream will probably be obtained, and after that the problem will be similar to the situation in the older natural gas sections, where a high proportion of house heating business is now served and where the gas company has to solicit this business among those of its customers who are not the most prosperous in the community.

These newer natural gas sections have the same opportunity as the old sections to sell the newer uses of gas, such as refrigeration, incineration, etc. Again, however, it is true that customer acceptance for this equipment has not been developed and the sale of such equipment will be relatively slow and expensive. The volume of gas sales that can be built up through these appliances is small as compared to the volume of water heating and house heating sales which can be more easily obtained. The quickest results in load building will probably be obtained if the major sales activity is on water heating and house heating. In some of the southern sections refrigeration offers a desirable class of load and development of this business should receive thought and work.

Generally speaking, there should be great possibilities for developing commercial load in these communities where natural gas has only recently been made available. Introduction of the lower cost gas service should open up a field for additional sales for all kinds of commercial uses. This field should be most enthusiastically cultivated.

The same is true of the industrial load in these newer communities. The natural gas should open the way for obtaining a large volume of business which it was impossible to secure on the basis of the old manufactured gas service.

Offers Important Outlet

The above emphasizes the fact that in the older natural gas sections house heating offers about the only outlet for additional domestic sales, and, in the newer sections it offers the largest possible outlet for increased domestic sales. Now it is true that house heating has objectionable features. It results in high peak loads during cold weather, with a relatively low annual load factor. In the north central portion of the country, it has been found to have a load factor of about 25 per cent. A house heating load factor of this kind offers a real problem in connection with the operation of long pipe lines. Some in the utility business have not favored the building up of house heating sales on account of this load factor problem. It seems, however, that if the gas industry is to increase domestic sales and fulfill the service requirements of modern times, it is going to be necessary that this load be served in great volume. While it is true that it will give a relatively low load factor, the situation is not hopeless.

The electric industry has built up a large and profitable business in classes of service which have a load factor no greater than house heating, notably residential lighting load, and much of the power load. One of the secrets of its success is that through study, research, and sales efforts it has offset low load factor business with other business which has brought the average to a level which can be profitably served.

The best thought and effort of the gas industry must be devoted to developing other uses of gas which will offset the winter peak of the house heating load, and raise the annual average load factor. The industrial business offers great possibilities along this line. Some industrial companies can operate so as to make small demands for service during the winter months and use the most of their gas service during the summer months. Business of this kind should be searched for and obtained.

Developing Off-Peak Load

Then too, there are many industrial companies operating producer gas plants which may be obtained on a basis by

(Continued on Page 101)

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Origin and Removal of Pipe Line Dust

This Nuisance May Come From Great Variety of Sources and Manifests Itself in Large Number of Operating Difficulties

By D. A. Sillers
Lone Star Gas Co., Dallas, Tex.*

Dust in natural gas pipe line systems may come from a great variety of sources. It manifests itself in a large number of operating difficulties. Many methods have been used for its elimination and the conclusions which may be reached with regard to any particular dust problem are sometimes as varied as the number of engineers considering the problem. Although considerable work is being done along the line of designing test apparatus for determining quantitatively the amount of dust carried by gas at some particular point in the line, no such device has yet been perfected. Even were such a device available its usefulness would be rather doubtful due to the fact that a slight change in operating will cause a cloud of dust to be carried down a line which normally may carry practically no dust.

Sources of Pipe Line Dust

Sources of pipe line dust may be roughly enumerated as follows:

1. Well Sand.—This condition is found at its worst in Texas fields around the Gulf Coast. Most of these wells produce from a very loose fine sand. They have a rock pressure well over 1,000 pounds and very large open flows. In some other fields throughout the country well sand has been found to be responsible for some dust in the pipe lines, sometimes appearing in the lines as the wells are pulled down to low pressures, although this condition is not very generally reported.

2. Construction dirt is blamed by most operators for most of their pipe line dust troubles. This dust includes sand and mud picked up by the pipe while being laid in the line. Lunch boxes, blue prints, rabbits, etc., are often left in the line during construction. Pipe scale is one of the major sources of pipe line dust. Even though the pipe is carefully swabbed during construction, it can be readily appreciated that from approximately 40 square feet of surface on the inside of a 20-foot joint of 16-inch pipe it would be comparatively easy to dislodge a cupful of mill-scale and dirt which would not be removed by the usual swabbing. This means about 250 cups of potential pipe line dust per mile or 25,000 cups for a 100-mile line.

3. Corrosion of pipe is another of the major causes of pipe line dust. During construction most pipe is exposed to water and air sufficiently that a certain amount of rusting takes place where the mill-scale has broken away from the pipe before it is laid. Most pipe lines contain some water and where residue gas is handled there is some air or oxygen content and the combination of the two result in internal corrosion of the pipe. It has been conjectured that gas from the well may contain infinitely small quantities of oxygen which might be caught by water in the line, resulting in corrosion. In a few isolated cases the high sulphur content attacks the pipe and forms a complex combination of iron and sulphur. This forms a black deposit which is sometimes inflammable when exposed to the air.

Changes in Material Carried

4. Changes in the material carried in the line may result in pipe line dust. Some oil lines have been converted to handle natural gas. Such converted oil lines contain considerable sand and dirt which is stuck to the pipe with oil. Natural gas gradually dries up the oil allowing the remaining dry dirt to drop away from the pipe wall. Changing from manufactured gas to natural gas often results in the drying out of the oil and gum deposited from the manufactured gas.

Where the manufactured gas has not been well purified the deposits will of course be much greater. One company experienced considerable trouble when producer gas was used to mix with natural gas and later the producer gas was gradually replaced by blue water gas. During the time the blue water gas was used for mixing and later when straight natural gas was used a great deal of dust was encountered, evidently deposited in the line during the time the producer gas was used. A year or so after this line was back on straight natural gas the dust trouble cleared up.

Manifestations of Dust Troubles

Manifestations of dust troubles are of course familiar to the operators who are interested in the problem. They include:

1. Cutting Out Compressor Valves, Rings and Liners.—In many cases dust has made necessary the shutting down of compressors daily for the regrinding and cleaning of valves and have caused very frequent replacement of rings and liners.

2. Pressure reducing regulator valves are cut out so that they will not shut off when required and often are so badly worn that they are almost totally ineffective.

3. Deposits on orifice meter plates often build up to a thickness of one-quarter inch or more near the orifice and may result in making the meter as much as 8 or 10 per cent slow due to the sharp square edge being replaced by a surface which approaches the venturi stream line flow.

4. Positive meters have been found to fill up with dust until they cease to run, the valves become badly scored resulting in the slow registration and the dust cuts out working parts and bearings, resulting in expensive repairs and replacements.

5. The clogging of fittings, burners and pilot lights is the form of dust trouble which is most harmful from the standpoint of losing the goodwill of the industrial and domestic consumers. The clogging of pilot lights in water heaters is one of the first and most troublesome of dust problems. This is usually followed by the clogging up of burners in domestic appliances and then by the clogging of burners in industrial installations.

6. Clogging of gasoline plant apparatus is another major difficulty resulting from dust in the line. A mineral seal oil absorption plant forms almost an ideal dust-trap. The absorbers become filled with dust, the oil soaked dust becomes packed, causing channeling in the baffle type and filling up the trays in the bubble type absorbers, and often bridges over oil outlets when operations are temporarily discontinued, resulting in difficulty in putting the apparatus back into service.

7. Reduction of capacity of pipe lines is a dust trouble which is not so generally encountered, although one company has found this a serious matter and reports finding a joint of 18-inch pipe which had been reduced to a 6-inch opening by hardened cakes of oily dust in the line.

Elimination of Dust

Elimination of pipe line dust is accomplished in a number of different ways.

1. Low velocity of gas flow accomplished by passing the gas through a vessel of much greater relative diameter will result in a settling out of a considerable portion of the dust. For instance, one company ran an 8-inch line into a 20-inch header from which extended ten 18-inch lines about 100 feet long. Such an arrangement will remove considerable dust but the investment is very much greater than in more efficient types of cleaners.

2. Centrifugal force is the principle first tried out in most experiments to remove pipe line dust. It soon becomes apparent that pipe line dust is in such finely divided particles that the mass of any individual particle is not sufficient to carry it by centrifugal force through a stream of gas of high density moving at high velocity. Centrifugal devices will remove large particles of foreign matter and a very efficiently designed centrifugal device will remove considerable quantities of the fine dust if operated at the proper velocity. These devices have not been considered successful due to the velocity control necessary and the large amount of fine dust which is not removed.

3. Strainers of various types have been used for a number of years. In California a large cotton bag is placed in a large container. The gas enters the bag at one end and leaves the container near the top of the other end, the gas having to pass through the bag. Periodically the dust collected inside the bag is removed. The use of this method is restricted to installations on low-pressure gas ahead of district regulators in the distribution system. One difficulty with this method is the possibility of dust being blown about in a residual section when the bags are being emptied.

Many Variations Used

Many variations of oiled excelsior, hair, or sea moss design have been used. In most of these devices the gas enters at the bottom and passes up through one or more trays or compartments filled with the oiled hairs or moss. Periodically the material is removed and cleaned. There are differences of opinion regarding the efficiency of this type of cleaner. The device must be of large volume in order that the material will not be clogged up with dirt and the supply of gas shut off. The amount of dust which can be trapped is limited to the amount which will cling to the oily surface of material. When this oiled surface is covered with dirt the gas begins to channel through the material and the device is no longer effective. The difficulty with this principle is that the entrained dust is held directly in the path of the gas, restricting its flow, and thus increasing its velocity. This ultimately results in the increased velocity carrying the dust through channels in the material. This principle has been used very extensively for air cleaners on the air intake to gasoline engines. In this service the air passes through the device at atmospheric pressure and thus at low density. Relatively small amounts of dust are present in the air and the separating material is readily removed for cleaning. The most recent types of air cleaners have been improved by providing for a flow of oil down through the material thus washing off and removing the entrained dust from the path of air.

Oil Contact Cleaners

4. Oil contact cleaners are the type most generally used in the industry for removing dust. Most of the credit for the development of this design falls to the engineers of the Cities Service Gas Co., who developed the original oil contact type cleaner. The natural affinity between oil and dust is very generally known. The device consists of a lower or mixing chamber where all of the gas comes in intimate contact with an oil spray, and an upper or separating chamber where the gas and oil spray are separated and the oil returned to the lower chamber. The velocity of the gas impinging on the oil surface results in an oil spray which completely contacts the gas.

The efficiency of the oil contact principle is practically 100 per cent as no indication of dust passing through such a device has ever been found. The efficiency of the device depends on its ability to separate the gas from the oil and prevent the oil from leaving the cleaner. A great deal of research work conducted during the past five or six years has resulted in improvements in the separating chamber, which has more than doubled the volume of gas which may be passed through a cleaner of a certain size. The merits of this type of cleaner lie in the complete removal of dust, the fact that it cannot clog up, and the ease with which the precipitated dust can be removed from the device.

Individual Problems Presented

In this paper the writer has attempted to consider the problem as it affects the industry generally rather than to cite specific experiences with dust problems on our own pipe line system. The origin and elimination of dust presents an individual problem in each part of our own pipe line system and so will be an individual problem with every other company giving it consideration. We have not been able to determine the exact cause of or the exact place at which the dust originates.

It is necessary to consider a large number of factors including sources of the gas in the pipe line, the chemical analysis of the gases and the impurities therein, the condition of the pipe when laid and the conditions surrounding the laying of the pipe, the number of years the line has been in service, changes in the kind of gases carried by the line and changes in the operation of the line, such as the direction of flow, the pressure at which the gas is handled and the velocity of the gas in the line. All of these factors must be studied in each individual case to determine the exact situation and the practical methods necessary to combat it. The diversity of experience and opinion regarding this problem will be illustrated by quotations from letters which the writer has recently received from other companies regarding the problem.

What Others Say

"When using dry natural gas we have experienced the accumulation of dust in our distribution plants caused from foreign matter left in lines when originally laid and a certain amount of mill-scale."

"When handling residue gas from the oil sands there has been a building up of carbon in our lines which we presume is the effect of sulphur on the steel."

"In our fields there is a certain amount of fine sand as well as scale that gets into the lines during heavy drags on the wells but most of this matter is caught and blown away through drips."

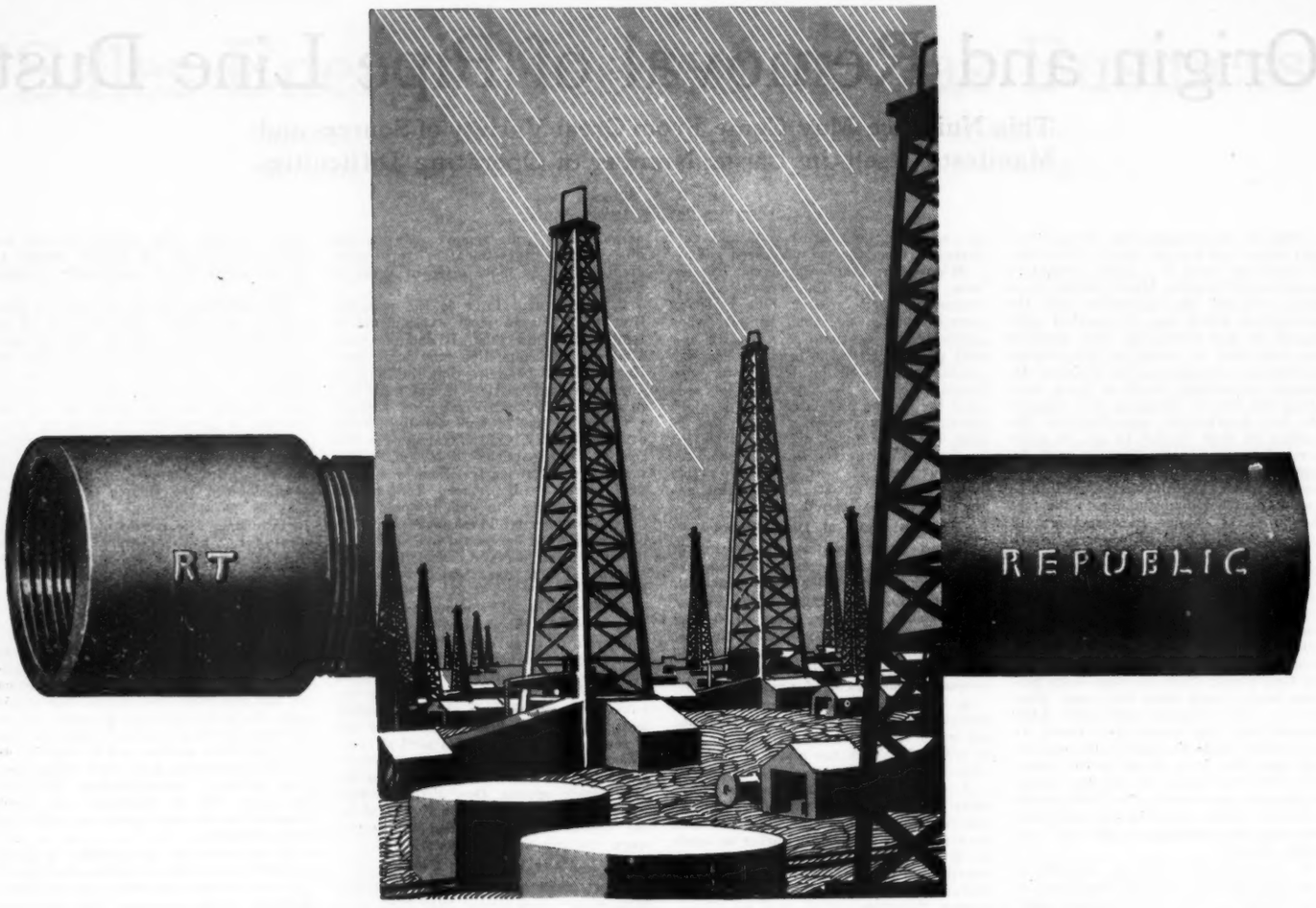
"We have had no very serious experience with dust in our lines except that occasionally we do have trouble in certain sections which we have in nearly every case found to be the result of a well which has put in dusty gas. Whenever something occurs in this neighborhood to increase the speed in the line, we usually have some local dust troubles."

"We have found considerable sulphur deposits in a main which formerly handled manufactured gas, which was not properly purified, though as far as we can find very little of this deposit has been carried along with the gas."

"By far the major trouble which we experience from dust in our lines has its origin within the pipe lines. We experi-

(Continued on Page 101)

*Before convention Natural Gas Department American Gas Association, Memphis, Tenn., May 11-14.



THE OIL INDUSTRY IS BECOMING PIPE CONSCIOUS

Realization of the terrific cost of pipe failure is causing oil producers and refiners to become more and more pipe conscious. The industry's pipe replacement bill, if it could be totalled, would reach a staggering amount. This condition has not been caused by the use of cheap pipe but has been due to the inability of the older ferrous pipe materials to stand up in tubing, casing, line pipe, cargo lines on tankers, and refinery piping in general, especially when acid and salt bearing crude must be handled.

Now you can play safe. Out of the bag of tricks of modern science has come a pipe material that is intensely practical. About this metallurgical triumph there is nothing mythical, nothing theoretical. It is the result of more than twenty years of constant research and steady betterment. It is known as Toncan Iron and today this alloy of refined iron, copper and molybdenum, from the standpoint of resistance to rust and corrosion, unquestionably holds first place as a commercial pipe material, ranking second only to the far more expensive stainless alloys.

The story of Toncan Iron is one of vital interest to everyone looking for a pipe that will last longer and cost less. It is contained in a book now ready for distribution. Ask for your copy of "Pipe for Permanence"—second edition.

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GENERAL OFFICES: YOUNGSTOWN, OHIO

Hardin County, O., Gets 90 Barrel Well

Another Completion There Is a 25-Bbl. Initial Producer. Henry County Getting Play for Gas. New Central Ohio Tests

By George A. Whitney
Staff Correspondent, Central West Fields

FINDLAY, Ohio, May 11.—In the Lima Field of northwestern Ohio, the outstanding well was the Wiser Oil Co.'s No. 4 on the Grant Geiger farm, Section 12, Cessna Township, Hardin County, with an initial of 90 bbls. from the Trenton limestone formation at approximately 1,300 feet. In Pleasants Township, same county, Abbott Brothers' test on the B. H. and E. V. Oats farm, Section 9, produced 25 bbls. initially with 51,000 feet of gas in the same formation from 1,323-31 feet. The Jupiter Oil Co. made a location on the George A. Matthews farm, Section 18, same township, and started spudding. Wiser Oil Co. is drilling No. 5 Grant Geiger, Section 12, Cessna Township. The Kemrow Co.'s No. 1 C. L. Radabaugh farm, Section 10,001, Taylor Township, same county, was dry in the Trenton lime from 1,420-80 feet.

Harry Manion and others' test on the George and Mollie Schillinger farm, Section 11, Noble Township, Auglaize County, proved a dry hole. John Lauber abandoned Nos. 1 and 2 wells on the Sebastian Lauber farm, Section 19, Granville Township, Mercer County. Spencer and Pontius abandoned old No. 1 on the Clare Ludy farm, Section 10, Mississinewa Township, Darke County.

Eilerman Oil Co. is drilling a second test on the George W. Treiber farm, Section 26, Cynthian Township, Shelby County, which showed some gas at a shallow depth and above the Trenton lime formation.

One area on the outer edge of the Trenton lime field to the west is being closely watched by those interested in natural gas, as the Lake Shore & Southwestern Oil & Metal Co., along with the Henry County Oil & Gas Co., on the E. Buel Fiser farm, Section 27, Damascus Township, Henry County, brought in a nice well recently near the hamlet of McClure. The gas, it is reported, will be piped to Napoleon, west of McClure, and possibly to Grand Rapids, which is a short distance to the northeast of Mcclude; also to Malinta, to the southwest of McClure. Three other wells are under way in Damascus Township and one in Monroe Township, Henry County.

CENTRAL OHIO

Seven completions were announced in the Central Ohio Field, only one being an oil well, drilled by the Edson Co., No. 18 Marcus A. Frank farm, Lot 20, Chatham Township, Medina County, at from 402 to 457 feet. C. L. Williams and others' second test on the C. G. Chapman farm, Lot 6, same township, is a light gas well, while Heimer and others' No. 6 William M. Geisinger farm, Lot 10, was a dry hole from 372 to 383 feet. Commonwealth Gas Corp. made a location for No. 4 Frank Rader farm, Lot 4, Homer Township, same county.

In Summitt County, Green Township, Eagon and others have a fair gas well on the Catherine Selzer farm, Section 7, at from 3,987 to 4,025 feet.

In Coshocton County, Perry Township, the Preston Oil Co.'s No. 1-1,479 Albert Mikesell farm, Section 7, is a duster at from 3,240-88 feet.

In Belmont County, Somerset Township, the test of Carrie J. Smith and others on the Carrie J. Smith farm, Section 7, is reported a dry hole in the Keener sand at a total depth of 1,402 feet, but may be drilled deeper. J. W. Kirk and others are drilling on the J. N. Cates farm, Section 23, same township. A. D. Crouch and others' No. 4 Amos S. Litton farm, Sections 14-20, Colerain Township, same county, which has been delayed a long time by a fishing job, is reported dry at a total depth of 1,922 feet. Frank Stranges has a rig in for No. 4 J. H. Barber farm, Sections 27-33, Union Township, same county.

New Wells Starting

The National Geophysical Survey Co. is drilling on the Joseph W. Vouse farm, Section 35, Harrison Township, Pickaway County, far in advance to any known production, and south of Columbus.

Gallin Development Co.'s No. 2 Sallie Steenberger farm, Section 22, Chechire Township, Gallia County, found the Maxon sand from 715 to 745 feet, with a hole full of water and may case off the water and make a deeper test.

F. A. Brendall and others have a rig on the T. J. and F. A. Lesser farm, Section 12, Lawrence Township, Stark County. In Jackson Township the East Ohio Gas Co. is drilling on the John Strouble farm, Section 23, and made a location for No. 3 T. K. Harris farm, Section 34, same township. F. A. Brendall and others are drilling on the Sam Willaman farm, Section 10, same township.

Chartiers Oil & Gas Co. has a rig on the Dora A. Wilson farm, Section 17, York Township, Athens County. T. L. McGrath is drilling on the John R. Raible farm in Rockport Township, Cuyahoga County, near Cleveland. Edington and others are drilling on the J. W. Edington farm, Section 15, Canaan Township, Wayne County, in the Wooster area. Elyria Steel & Tube Co. made a location for a second test on the F. E. Schwartz and others property, Section 17, Carlisle Township, Lorain County.

Ohio Fuel Gas Co. has a gas well on the John Carr farm, Section 24, Rutland Township, Heigs County. Same company has a gas well in No. 1-5,410 A. L. Cochran farm in the third-quarter section of Newcastle Township, in Coshocton County.

INDIANA AND ILLINOIS

No completions were reported from any part of Indiana and but one new well in Illinois, which was John Lutton's No. 2 on his own property, Section 17, Sugar Loaf Township, St. Clair County, in the southwestern part of the State, which was dry at a total depth of 2,130 feet. This is the deepest test yet made in that area, known as the Dupo Field, southeast of East St. Louis. There are only two more wells drilling in that part of Illinois, Hans Wolf's No. 3 Oliver Anderline farm, Section 33, same township, and Ritter and others' No. 1 William Schaffer, in the Millstadt section, in Survey No. 5, same county. Robert A. Murray and others have abandoned No. 1 Charles Drake, Lot 5, Section 21, Sugar Loaf Township.

In Lawrence County, Bridgeport Township, the Ohio Oil Co. abandoned Nos. 1 and 2 John P. Middagh No. 2 farm, SE Section 1. Same company abandoned No. 7 H. W. Hostettler, SE Section 20, Petty Township. Same company in Lawrence Township, same county, abandoned No. 2 P. Barnes, SE Section 1; No. 2 L. C. Cole farm, NE NW Section 17; No. 2 L. C. Cole, SW Section 17, and No. 4 P. M. O'Donnell in the SW Section 17. Borough, Breen and others pulled out their Nos. 1 and 2 J. W. Cleve farm, NE Section 3, also in Lawrence Township.

KENTUCKY

The only completion reported in the Owensboro Field for the week was in Ohio County, where the Kentucky Natural Gas Co. drilled a dry hole in No. 7 on the J. T. Griffith 225 acres in the Reynolds Pool at a depth of 785 feet. In the same county Harry Russel and others are drilling No. 4 on the Lee Farmer farm in the old Colyer Pool, and Jackson and others are drilling No. 2 on the John Bellamy farm in the Friendship Pool, same county.

In Hart County unknown parties are drilling on the James Puckett farm, in the Logsdon Valley Pool, southwest of Munfordville, the county seat. Unknown parties are working on the Mollie Fitzgerald farm, near Dennison's Ferry, and a test is drilling on the Geralds farm, along the Hart and Edmonson County line, north of the Legrande Pool. This is the first well to be started in that territory and if oil or gas is found will mean another new pool.

Munfordville parties have moved a rig near the Camp Ground Church on Bacon Creek. Drilling was temporarily halted for the moving of a heavier rig for a deeper test.

The Green River Oil & Gas Co. is drilling in Edmonson County, approximately 5 miles west of Dennison's Ferry, on the Barbee farm, and is down around 300 feet.

A well is being drilled on the William McCorkle farm, in Hart County, and the drill passed through the cap rock without finding the usual pay sand, which is something out of the ordinary and would naturally mean a dry hole if it were located in the Legrande Pool, as the oil in most instances is found just below the cap rock. It will be drilled 25 feet deeper and, if not a producer, may be abandoned.

PENNSYLVANIA GEOLOGISTS GIVE REPORT ON TIOGA COUNTY FIELD

WELLSBORO, Pa., May 9.—A report giving the status of drilling operations in the Tioga Field has been issued by Stanley H. Cathcart and Bradford Willard of the Pennsylvania Topographic and Geologic Survey. It is known as Bulletin No. 102, edition of April 17, and contains much valuable information on this new field. The bulletin is the second to be issued on the Tioga Field.

Regarding this field the bulletin states:

Gas was discovered in the Oriskany sand on the Sabinsville anticline in Farmington Township, Tioga County, in September, 1930. Between mid-September and mid-February four successful wells were brought in. Their capacity is 2,500,000, 14,000,000, 25,000,000 and 62,000,000 feet a day of sweet gas and the average shut-in pressure of the wells is between 1,600 and 1,700 pounds.

Wells of such promise in essentially virgin territory and favorably situated geographically have of course attracted much attention. About 3,600 leases have been recorded in Tioga County alone and many more in the adjacent counties. Numerous strong companies have leased acreage, and exploration of the region is now well started.

Status of Operations

The result and status of developments up to April 17 may be summarized as follows:

Total number of locations tested or active, 46; wells completed, 11; successful, 4; failed, 7; wells drilling, 23; locations occupied, 8; locations made, 4; deep tests under way, 1.

In appraising the results of drilling in the region, the relative position as well as the result of completions must be considered. The results of drilling, four successes out of 11 completions, is not unfavorable. This is wildcat territory and a large percentage of the completions represent well-spaced exploratory wells. One failure is located on a neighboring (Harrison) anticline and probably at some distance from the anticlinal axis. Three are step outs (6½ and 8½ miles northeast and 15¾ miles southwest of discovery) on the Sabinsville anticline and two are flank tests that got salt water. The remaining failure, located within 1,200 feet of discovery, in apparently equally favorable structural position, found the Oriskany horizon nonproductive and several hundred feet deeper than anticipated.

Structurally the wells drilling or preparing to drill are as follows: Twenty-eight are on the Sabinsville anticline, four on the Wellsboro, one on the Muncy Creek, one on the Laurel Hill, and one on the Towanda anticline. Some of the first group are relatively close to a successful well and it is to be expected that a large percentage of these locations will yield producers and materially change the existing ratio of successful wells to failures. Seven locations have regional significance and it is probable additional wells will be started on structures other than the Sabinsville anticline in the near future. This is in keeping with best exploratory practice and will permit an appraisal of the Tioga region vs. the Tioga Field.

Field Not Defined

The "Tioga Field" as indicated by the Palmer, Farr, Close and Meaker wells is not defined. The length of the field to date as defined by the Close and Meaker wells is 7 miles. The Bostick and Howe wells, both of which got salt water in flank position north and south of the Palmer well, are 2¼ miles apart. This suggests that production may be expected throughout a belt on the anticline, 7 miles long by something like 2 miles wide. That this belt will not everywhere be productive is shown by the result of No. 1 Kemp and the assumption of uniform width based upon two wells is not sound. The width may locally be greater or less than 2 miles. A conservative appraisal of this data suggests that the field may be extended appreciably to the southwest. The failure of the Harrison and Schumacker wells, 2½ and 5 miles northeast of No. 1 Meaker, together with the relatively low structural position of No. 1 Meaker as compared with No. 1 E. W. Close, suggests the extension to the northeast will be relatively slight. However, the anticline northeast of No. 1 Meaker cannot be condemned by two wells.

All of the four producers came in with rock pressures varying within the probable limits of 1,600-1,700 pounds. Three of the four blew wild for a period of one to two weeks in a manner spectacular for the Appalachian region. With the exception of the discovery well all have been shut in since controlled.

The discovery well, No. 1 Palmer, has been producing constantly. Its initial production was variously estimated at 10,000,000 to 20,000,000 feet a day, but as a result of cementing the well in the process of controlling it, its output when finally turned into the line was about 2,000,000 feet a day. In March it was

(Continued on Page 101)

TWO GREAT

THE Champion

Long experience, intelligent research, and the desire to make this the aristocrat of all derricks, are reflected in the Moore Champion. In it is focused twenty-four years of continuous progress in the use of tubular steel sections for derrick construction. The efficient strength of 40-50 carbon seamless steel pipe—A.P.I. Grade C—is utilized for leg sections, while the carefully designed bracing is composed of structural steel. The Moore Champion has proven itself an exceptionally strong, economical derrick. A.P.I. standards are adhered to in every respect.

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Moore Champion DERRICK

Athens County, Ohio, Has 200 Bbl. Well

Five Oil Producers Completed in Southeastern Ohio. Muskingum, Medina and Washington Counties Represented

By Staff Correspondent

PITTSBURGH, Pa., May 11. — Two hundred forty barrels initial production, produced within the first 24 hours, is the report on five oil wells completed in the Southeast Ohio Field during the week. One dry hole and a gasser producing 500,000 feet a day were also reported from this field.

The outsanding feature of the oil well completions is the Hocking Valley Drilling Co. and others' No. 3, on the Hocking and Athens Coal Co. tract in the SW, Section 35, York Township, Athens County. This well is producing at the rate of 200 bbls. from the Clinton sand at a depth of 3,170 feet. The owners have indicated it is not their intention to have this well shot for some time.

In Muskingum County, Hopewell Township, the Hopewell Fuel & Gas Co. drilled its test on the Z. Slick farm in the SE, Section 6, to 3,193 feet and in the Clinton sand where it is producing at the rate of 20 bbls. A 10-bbl. pumper is the result of drilling No. 12 of Charles R. Jones on the William F. Lewis farm in the NE, Section 8, Cross Creek Township, Jefferson County, to 1,597 feet. It is producing from the Berea grit.

E. R. Edson & Son Co. completed another well in the Medina County Field with the same success that has been attending their operations in this county. On the Archie E. Packard farm in Section 13, Lot 6, Chatham Township, No. 14 was completed at 365 feet in the Cow Run sand for an 8-bbl. producer. John T. Cleary and others drilled their No. 3 on the Jacob Morningstar farm on Whipple Run, Lot 134, Fearing Township, Washington County, to the Buell Run sand, where it was shot at 621 feet for a 2-bbl. producer.

The J. H. Moore farm at Bolling Mills, Section 4, Knox Township, Vinton County, is the location of a test belonging to the Co-Operative Oil Co. At 1,149 feet and in grit this well was completed as a 500,000-foot gasser.

The Preston Oil Co.'s test on the Albert Mikesell farm in Section 7, Perry Township, Coshocton County, was completed in the Clinton sand as a dry hole, and the test of Heines and others on the William M. Geisinger farm, Lot 10, Section 9, Chatham Township, Medina County, was completed at 428 feet and in the Cow Run sand. This test was likewise dry.

Drilling in Ohio

The deep test of Benedum & Trees Co. in Section 26, Island Township, Jefferson County, was shut down for two weeks or more at the 5,100-foot level awaiting on material. A 10-inch hole was drilled to a depth of 4,950 feet or the Niagara Lime sand and from that level an 8-inch hole is to be drilled to the Clinton sand which is expected to be found at about 6,200 feet. The old Wayne Coal Co. tract, now the property of the Eastern Ohio Development Co., a Benedum & Trees subsidiary, is the location of this test. Drilling has been resumed, and interesting reports should be expected very soon.

In Noble County the following operations are reported: Way Wickens and others are rigged up for a second test on the J. M. Rowland farm in Enoch Township, Section 32. The test of H. G. Clymer and others on Iva Masters' farm in Section 32, Marion Township, has been drilled to 200 feet, and the test of Charles Knott and others on the Moody Archibald farm in Section 8, Sharon Township, has been drilled down to 500 feet.

The 200-foot level has been reached in the drilling of the second test of R. L. Wright on the John W. Helshu farm in Section 146, Salem Township, Washington County.

WEST VIRGINIA

There was a slight falling off in the number of completions reported from the West Virginia Field, but still gassers predominated. There were six gassers completed and two oil wells brought in. One operation was ended in a dry hole.

A 4,500,000-foot gasser was brought in at 2,127 feet and in the Injun sand in Calhoun County. It is the property of E. N. Smith and others and is on the John Evans farm in Lee district. It is a test well. The Hope Construction & Refining Co. drilled its test on the W. G. Bennett farm in Sherman district through to the Injun sand from the Maxon sand where it was an oil producer. In the Injun sand this well is producing at the rate of 500,000 feet of gas per day.

In Ritchie County, U. C. Pierce and others completed their test on the H. A. Goff farm in Union district at a depth of 2,160 feet and in the Berea sand for a gasser. In Lewis County Fred Flesher completed his test on the Mary Flesher farm in the Benson sand for a light gasser, after drilling to a depth of 4,063 feet.

On the headwaters of Sycamore Creek on the R. A. Scott farm in Union district, Harrison County, is located the test of the Reserve Gas Co. This well was completed at a depth of 2,250 feet and in the Speechley sand as a good gasser. The Manufacturers Light & Heat Co. brought in its No. 3,469 on the A. E. Lemasters farm in McElroy district, Tyler County, after drilling to the 3,129-foot level, as a very light gasser. The Gordon sand was found between 2,936 and 2,960 feet, and the gas was found at the 2,936-foot level.

The Daniel O'Day estate's No. 4 on the F. H. Markey farm in Grant district, Ritchie County, was completed in the Salt sand for a 2-bbl. producer. This well is on Sheep Run. The Manufacturers Light & Heat Co.'s No. 3,380 on the W. H. Loper and others' farm in Liberty district, Marshall County, was brought in at 3,101 feet as an oil well.

The only dry hole reported from the West Virginia Field was that of the Gilco Oil & Gas Co. on the Ernest Woofter farm in Cove district, Doddridge County. This test was completed at 2,644 feet and found dry in all the formations.

In scattered counties there are three wells awaiting upon tests. They are the second test of Louis R. Sweetland on the T. J. Hoskinson farm in Carroll district, Lincoln County, at 2,358 feet and in the Berea sand; the second test of C. H. McClure on the Isaac Weekley farm in Grant district, Ritchie County, at 1,734 feet, and the second test of the Ben Lomond Land Co. on the C. C. Wolfe property in Guyandot district, Cabell County, at 2,960 feet and in Brown shale.

On Sugar Camp Run, and on the W. H. Enoch heirs farm, the Heck Oil Co. cleaned out its No. 3 well. This operation more than doubled the production of this oil producer. It was a 10-bbl. producer and is now pumping at the rate of 25 bbls. per day.

Drilling in West Virginia

In Boone County the Owens-Illinois Glass Co., the Pure Oil Co. and Godfrey L. Cabot are the most active operators in an active field. In Sherman district the Pure Oil Co. has made a location for No. 256 on the Williams Coal Co. tract and has a rig standing thereon. Its No. 52 on the Federal Coal Co. tract is drilling at a depth of 1,362 feet, and No. 53 is spudded in at 53 feet.

The Owens-Illinois Glass Co.'s No. 9, on the Safe Deposit & Trust Co. property in Peytonia district, is shut down at 1,813 feet, and on the Broun-Cochran tract the same operators have a rig standing for well No. 7. Rigs are standing and tools are on the locations for No. 21 on the Cassingham and others property and for a second test on the S. M. Wheeler property in Scott district. On the Little Coal Land Co. tract in Washington district, these operators have made a location for No. 13. Construction of a road to the location of a proposed No. 20 on the Peytonia Coal Land Co. tract in Sherman district is in process, and for No. 21 on this tract the rig has been built and the tools are on the ground.

Godfrey L. Cabot's activities consist of the construction of rigs for Nos. 46, 47 and 48 on the Federal Coal Co. tract in Sherman district, Boone County. A rig has been constructed for No. 5 on the Mary Dickinson farm in the same district. Locations have been made by this operator for a second test on the J. Q. Dickinson farm, and for No. 31 on the Federal Coal Co. tract. Both of these properties are in Sherman district.

Boone County

The only other operator reported as being active in Boone County is the Cameron Oil & Gas Co. This company has drilled its test on the E. T. Price and others property in Washington district, down to the 1,700-foot level.

In Lincoln County, the test of Frank Yates on his own property is shut down after having been drilled to a depth of 1,810 feet. The Yates farm is in Harts Creek district. The Jefferson Gas Co. has part of the material on the location selected for No. 4 on the Richard Miller farm in Jefferson district. No. 3 of Katherine Moore, administratrix, on the B. F. Roberts farm in Carrol district, is shut down at a depth of 2,160 feet. The Woodyal Gas Co. is drilling in its No. 3 on the James and Isiahm Adkins farm at 1,150 feet, and on the Matthias Adkins farm, A. F. Morris, trustee, is rigged up for a test. The Adkins farms are in Union district.

The Cambridge Gas Co. is constructing a rig on the McCorkle lots in Washington district, Lincoln County. The Martin Gas Co. has selected a location on the Sherman Johnson property in Sheridan district, and the David Gas Co. has one for No. 4 on the David Miller farm in Jefferson district. Louis R. Sweetland has also selected a location on the L. R. Sweetland, Min., property in Carroll district. This is a second well on this property.

On the Cowden and Workman property in Harvey district, Mingo County, the Ohio Southern Gas Co. has a rig in the process of construction.

In Wetzel County, Clay district, the Manufacturers Light & Heat Co. is cleaning out No. 2,190 on the A. and M. E. Jolliffe farm, making ready to drill this well deeper. In Proctor district, the second test of the same operators on the J. M. Newman farm has been drilled to a depth of 1,500 feet. The Carnegie Natural Gas Co. is fishing for its drilling tools at 3,127 feet in its No. 1,480 on the Whitlatch heirs' property. This property is in Church district, and in the same district the Curry Oil & Gas Co. has part of the material on the ground on the C. W. Curry farm.

In Mason County, the E. C. Moffett Drilling Co. is drilling its second test on the William Newton heirs' farm in Graham district, and in Cooper district, the Hartford Salt Works has selected a location on the Burt Sayre farm. In Williamsburg district, Greenbrier County, the Thompson Harris Co. has reached 1,940 feet on the Samuel Hinkle farm.

(Continued on Page 101)

NEW POTENTIAL OIL FIELD FOUND NEAR KEHO LAKE, SOUTHERN ALBERTA

By Victor Lauriston
Staff Correspondent, Canadian Fields

CHATHAM, Ontario, May 9.—A new potential oil field in the Lethbridge district of Southern Alberta was indicated when Hudson's Bay Oil & Gas Co.'s Keho No. 1, LSD 2, Section 17-11-22w4, near Keho Lake, encountered an encouraging show of medium heavy black crude in the Benton shale at 3,680 feet. The location is about 18 miles north of Lethbridge and 6 miles east of Nobleford, in territory previously untested. A bailing test was made, which indicated a production of 10 to 12 bbls. of black crude. No refinery test of the crude has been reported, but it is claimed to be considerably lighter than the Skiff heavy crude, and will grade between 22 and 25 degrees. The crude comes from a sandy band in the Benton shale. The only previous show of crude in the Bentons in the plains area of Alberta was met in the Alberta Pacific Consolidated's No. 1 Spring Coulee, in Section 15-4-23w4, at around 5,000 feet, then a core showed traces of oil in 6 feet of shale, but not sufficient to justify a test. Crude has, however, been encountered in the Benton horizon in the Turner Valley Field, though not in large quantities.

Hudson's Bay's Keho No. 1 is reported deepening at 3,760 feet, and carrying 10-inch casing. Production will be tested as the hole goes down, and if the Benton fails to yield commercial oil, drilling will be continued to the Blairmore-Kootenay horizon and the red beds. The test is located on a farm owned by L. M. Buck of State Center, Iowa.

The area first received attention in 1914, when a geologist named Reynolds investigated outcrops on Scabby Buttes, just west of the present location. A company was formed by Barons and Nobleford men, but owing to the war no drilling was done. Geological work was later carried on by Gordon Campbell of Montana and Wallace and Fife of California; and subsequently Glen M. Ruby mapped the structure for the former Hudson's Bay-Marland Oil Co.

This company was formed some years ago by the Hudson's Bay Co., one of the leading trading organizations in the Canadian West, and the Marland Oil Co. Later the Marland Oil Co. was absorbed by the Continental Oil Co.; and in 1929 the Canadian subsidiary was reorganized as the Hudson's Bay Oil & Gas Co. with headquarters at Winnipeg. Directors of the reorganized Co. are: D. J. Moran, W. H. Ferguson, Ponca City; G. W. Allen, J. Richardson, J. Thompson, Winnipeg; C. V. Tate, London, England, and R. Van A. Mills, the latter in general charge of the company's operations with headquarters at Calgary. Clare Phillips

(Continued on Page 118)

Personal Paragraphs About Oil Men

Bernard Borman has retired as vice president of the Great Western Oil Company, Inc.

* * *

E. J. Bullock, vice president, Standard Oil Company of Indiana, was in Tulsa during the week.

* * *

R. C. Fisher, welding engineer, American Steel & Wire Company, Chicago, Ill., was a business visitor in Tulsa recently.

* * *

James F. Corcoran, representing Trimont Manufacturing Company, is making a trip to East Texas to call on the trade.

* * *

J. L. Dittman, Mid-Continent representative of the Wall Rope Works, Inc., has returned from a visit to the factory in New York.

* * *

Alfred J. Williams, vice president, has been elected a director of Simms Petroleum Company, the board having been increased from 11 to 12.

* * *

R. N. Scott, of the Burmah Oil Company, Chauk, Upper Burmah, is in Los Angeles, Calif., visiting various fields and studying drilling practices.

* * *

R. J. Berry has been elected president of the Illinois Pipe Line Company, and Carl Gompf treasurer, the latter succeeding the late Frank J. Sargent.

* * *

Wallace A. Belstrom, vice president of Mills Bennett Production Company, Houston, Tex., has returned to his office from an extended trip through East Texas fields.

* * *

C. E. Reynolds, oil producer and president of the C. E. Reynolds Drilling Company, has removed his offices from the Perrine Building in Oklahoma City, Okla., to Okmulgee, Okla.

* * *

James H. Raymaker, general manager of the National Transit Pump & Machine Company, has been making a tour of the Mid-Continent fields and has returned to Oil City, Pa.

* * *

W. J. Rapson, formerly assistant to the late Ralph W. Loucks of the Carter Oil Company, in the Rocky Mountain states, has been promoted to the position held by Mr. Loucks.

* * *

T. C. Johnson, of Wichita, Kans., an independent operator and formerly state proration umpire of Kansas, has been inspecting the East Texas oil fields and is preparing to start operations there.

* * *

David Donoghue, geologist and petroleum statistician, has resigned as technical adviser to the Texas State Central Proration Committee, effective May 1 and will devote more time to private business.

* * *

B. E. Lindsly, assistant superintendent of the Bartlesville experiment station of the Bureau of Mines, has been working at Amarillo, Tex., with the different companies determining corrosion from oil and gas.

* * *

Col. Robert W. Stewart, during a stop-over in Los Angeles, Calif., on a round-the-world trip, said the oil industry has but two bogies to fear—Russia, and drop in gasoline consumption. Colonel Stewart was en route to New York.

* * *

W. R. Martin, president of the Martin Decker Corporation of California, was recently elected president of the newly organized Oil Equipment Export Association, which has for its purpose the stimulation of the California export market for oil field equipment. Other officials of the association include Theodore Sutter, first vice president; L. C. Harbert, secretary-treasurer; and B. A. Cleveland, C. H. Spotts, Alfred Flournoy, E. H. Adams, A. S. McIntyre, S. R. Bowen, E. Goesser and John Brant, directors.

C. M. Frost, president of the Eagle Oil Company, Houston, Tex., has been in New York City on business.

* * *

Jack Danciger, of the Danciger Oil & Refining Company, has left New York and is now in Montreal, Canada.

* * *

Hoke Martin, representing the Mathieson Alkali Works, New York, was a recent visitor to the Mid-Continent fields.

* * *

R. V. Hanrahan, president of the Humble Pipe Line Company, Houston, Tex., accompanied by Mrs. Hanrahan, spent several days in San Antonio, Tex., visiting their daughter.

Men of the Industry

John McNeil

John McNeil, recently appointed by Imperial Oil, Ltd., director in charge of marketing, was born in Gravenhurst, Ontario, son of a pioneer lumberman. He was educated in Toronto and then entered the service of a small local oil company which later was absorbed by the Canadian Oil Company. Mr. McNeil was transferred to Halifax as local manager, and later was placed in charge of the Winnipeg office.

In 1906 Mr. McNeil entered the employ of Imperial Oil, Ltd., in its Winnipeg sales office, which at that time handled all the marketing for western Canada. He became assistant to H. J. Guthrie, then general manager for western Canada, and when that territory was split in 1913 he became manager in Winnipeg. In 1914 he was transferred to the general sales offices, then located in Sarnia, where he had charge of gasoline and kerosene sales.

In 1916 Mr. McNeil moved to Toronto, with the transfer of the executive offices from Sarnia, and when F. J. Wolfe was appointed general sales manager, Mr. McNeil was made manager of sales of white products. In 1930 he was appointed assistant general sales manager for eastern Canada, and his recent promotion to the Imperial directorate followed the appointment of Mr. Wolfe as general manager of the Anglo-American Oil Company of London, England.

An associate of many years in the marketing organization has said of Mr. McNeil, "His chief characteristic is his mental and physical stability. He handles an enormous amount of work without exertion. His judgment is good, his good nature seldom ruffled. He always is fair, gives the other man a chance and always is ready to give assistance."

Ray Koster, sales engineer with the Camp-Morgan Company, is on his annual vacation, a fishing trip.

* * *

Fred W. Robertson, purchasing agent of the Skelly Oil Company, was in Kansas City, Mo., last week on business.

* * *

M. J. Foley, land department of the Ohio Oil Company, has been securing gas franchises in southern Montana for his company.

* * *

C. J. Hares, of Denver, Colo., geologist for the Ohio Oil Company, has been checking company properties in the Rock Springs, Wyo., district.

* * *

W. E. Berry, Houston, Tex., district representative of the Sheldon Machinery Company, has returned from an inspection trip through the East Texas fields.

* * *

Fero Williams, of the George F. Getty Company, Inc., recently addressed the Petroleum Accountants Society at Los Angeles, Calif., on "Accounting for Natural Gasoline."

* * *

Mark U. Weber, of Denver, Colo., is in Bartlesville, Okla., where he was called by the serious illness of a sister. Mr. Weber has been making his headquarters in Montana.

* * *

J. L. Dougan, superintendent of the Utah Southern Oil Company, Salt Lake City, Utah, has been making an inspection of his company's drilling well in Salt Valley district.

* * *

Burke H. Sinclair has resigned as sales manager for the Montana territory for the Standard Oil Company of Indiana and to take a similar position with the Sinclair Oil Company.

* * *

W. A. Coulter was elected a director of the Tide Water Associated Oil Company succeeding George White. F. I. Fallon, secretary, was elected an additional director, at the last annual meeting.

* * *

Clarence Tolan, Jr., vice president and Walter J. Small, sales representative of the Dodge Steel Company, Philadelphia, Pa., manufacturer of fittings and refinery equipment, were in Tulsa last week.

* * *

H. F. Sinclair, president of the Sinclair Consolidated Oil Corporation, and chairman of the board of the Rio Grande Oil Company, is expected to arrive in Los Angeles, Calif., within the next few days.

* * *

R. D. Wallace, of the land department of the Prairie Oil & Gas Company of Wyoming, has returned from Chicago, and left immediately for San Francisco and Los Angeles, Calif., on business for his company.

* * *

Carl F. von Bibra, president of the Exeter Oil Company, recently left Los Angeles Harbor for Europe via New York on a 107-day cruise with his family which will take them through the Panama Canal and to other points of interest.

* * *

John J. Lowery, with the Indian Territory Illuminating Oil Company, was appointed district superintendent of the north district of the Oklahoma City Field, and Clyde O. Deverse, was appointed district superintendent of the south district of the Oklahoma City Field.

* * *

R. A. Broomfield, Jr., is now manager of the land department of Barnsdall Oil Company of California. After graduating from the University of Southern California, he became a cable tool dresser in the old Kern River fields. When the company entered Washington last year, he was transferred to Bellingham to be in charge of land operations, and since has been assistant manager of the land department in charge of Kern County operations.

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SUCCESSFUL drilling contractors haven't time for any wire lines but those of proven dependability. Busy contractors in all fields have learned that the uniform high quality of UNION Wire Lines insures satisfactory service.

Shown above is Pasadena No. 6 of the I. T. I. O. Co. at Oklahoma City; Schoenfeld and Hunter, Contractors. The men, left to right, are: James A. Undercofler, Union Wire Rope Corp.; T. B. Hunter and D. L. Schoenfeld, contractors; W. L. Kitch, tool pusher; Charlie Rupe, driller; R. O. Webb, pipe-man; C. L. Jones, fireman; Joe Jones, derrickman; and T. Sweetman, derrickman.

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Natural Gas Industry Developments

NATURAL GAS VALUE GAIN IN CALIFORNIA

LOS ANGELES, Calif., May 9.—Value of natural gas utilized commercially in California during 1930 amounted to $30,825,000, the preliminary estimate of the Department of Natural Resources reveals. The total quantity used was 425,000,000,000 feet.

This places natural gas next to crude oil as the most valuable mineral produced in the state. Its value is three times the value of the state's gold production, nine times the copper value and twenty-six times the value of the cement produced.

On account of increased pipe facilities during 1931 and the installation of additional compressed gas service in many communities previously without gas or using artificial products, the utilization of dry gas for this year should be considerably greater than last year. The Southern Fuel Co.'s big line from Kettleman to Los Angeles is expected to be completed this fall, which will add greatly to total utilization of gas.

Pacific Gas & Electric has extended its pipe line facilities to many additional communities in the San Joaquin Valley during the first three months of this year. With continued expansion of the gas pipe lines system of the state, the department feels it is not unreasonable to expect the value of California dry gas some day in the not distant future to reach $100,000,000 a year.

The increase in gas utilization dry gas in 1930 compared to 1929 was comparatively small both in amount and value. The increase in quantity for 1930 over 1929 was 24,870,779,000 feet, or 6.2 per cent, and the increase in the value was $1,757,454, or equal to 6 per cent.

WEST OHIO GAS TO FINANCE

The West Ohio Gas Co. is seeking authority from the Ohio Public Utilities Commission to issue $300,000 of its first and refunding 6 per cent bonds to mature December 1, 1954, and 3,600 shares of its no-par common stock at $25 a share to yield not less than $90,000, to fund the greater portion of expenditures aggregating $483,489 made by the company in recent years for additions and improvements.

GAS FOR RIO GRANDE

RIO GRANDE, Tex., May 8.—Rio Grande and the United States Army post at Fort Ringgold are to be supplied with natural gas from Starr County fields, according to agreement reached with the Los Olmos Oil & Gas Co. The construction of a pipe line from the two wells on the Kelsey-Bass tract will mark the first commercial use of natural gas from this field.

MEMPHIS NATURAL GAS NET

Comparative income account of Memphis Natural Gas Co., affiliated with Appalachian Gas Corp., for the three months ended March 31, shows gross revenues of $549,186, against $482,460 for the corresponding 1930 period, an increase of 13.8 per cent, and net earnings before charges of $332,004, against $276,223, a gain of 20 per cent.

GAS MEN TO PHILADELPHIA

Production engineers and chemists of the gas industry will hold their fifth annual Joint Production and Chemical Conference at the Benjamin Franklin Hotel, Philadelphia, Pa., May 20-23, under the auspices of the carbonization, water gas and chemical committees, technical section of the American Gas Association.

RECORD IN HELIUM PRODUCTION MADE BY THE BUREAU OF MINES

WASHINGTON, D. C., May 11.—The Government's Amarillo, Tex., helium plant which was designed, built and is operated by the United States Bureau of Mines, Department of Commerce, established a new record in average daily output in March. Operating 22 2/5 days, the plant produced 1,297,000 feet of airship gas of substantially 98 per cent helium purity, containing 1,271,000 feet of helium. This averages 56,740 feet of contained helium per day, which is the highest rate ever maintained.

A statement by the department says:

The most remarkable feature of the record made in March is that the entire output was produced with only one of the two separation units of the plant in operation. This unit could have been operated at substantially the same rate for the entire 31 days of the month, producing about 1,750,000 feet of contained helium, but was shut down for 8 3/5 days to avoid exceeding the Government's demand for airship gas. Formerly the rated capacity of each unit was 1,000,000 feet of helium per month, giving a capacity of 2,000,000 feet per month for the plant. However, improvements that have been made by engineers of the Bureau of Mines, and experience that has been gained by the operating staff, have made it possible to raise the output far beyond the original rated capacity without lowering the efficiency or overstressing the plant equipment.

The Amarillo plant has never been operated at full capacity because the Government has not required all of the helium it can produce. The only month when the production of 1,271,000 feet of helium was exceeded was in June, 1930, when the Amarillo plant turned out 1,407,800 feet of contained helium. This production was obtained by operating the full 30 days of the month, and using both units most of the time. The present ability to turn out a larger production with only one unit, and the fact that the percentage recovery of helium in March, 1931, was about 6½ per cent higher than in June, 1930, gives some indication of the improvements made in the past nine months.

The total net expenditures for operation and maintenance in March were $9,888.89 or $7.78 per 1.000 for the 1,271,000 feet of contained helium produced. Much better unit costs could be attained if the demand for helium justified operation at a rate nearer the plant's full capacity. The 1,407,800 feet produced in June, 1930, required net expenditures for operation and maintenance of only $6.23 per 1,000, although the plant was not then as efficient as now.

For eight months out of the past 12, the plant's production has been limited to about 750,000 feet per month by the restricted government demand for helium. Nevertheless, in the year ending March 3, 1931, it produced 11,002,630 feet at a net operating cost of only $121,197.50. This is about one-third of what it would have cost to produce the same amount of helium at the Fort Worth plant, which supplied the Army and Navy before the plant at Amarillo was constructed. During the fiscal year when unit costs at Fort Worth were the lowest, expenditures of $318,446.40 for operation and maintenance were required to produce 9,355,623 feet of airship gas of about 94 per cent purity, containing about 8,800,000 feet of helium. Thus it will be seen that the Amarillo plant is now saving the Government about $200,000 per year in operating expense.

CHICAGO GETTING READY FOR NATURAL GAS USE

CHICAGO, May 11.—Plans are now well under way for making the necessary adjustments in the operations of the Peoples Gas Light & Coke Co. for the introduction of natural gas from the Texas Panhandle into the Chicago territory late this year.

Plans involve the organization of a special force of at least 2,000 men, intensively trained in educating the consumers in the proper usage of the new product. There are 9,000,000 gas appliance outlets or burners in service in Chicago and every one must be inspected, adjusted and "throttled down" to prevent the customer from wasting the richer gas.

MUSKEGON USING MORE GAS

MUSKEGON, Mich., May 11.—Increased industrial activity in Muskegon has resulted in consumption of about 50 per cent more natural gas since March 1. Natural gas consumption has increased during the past two months from less than 1,000,000 to about 1,400,000 feet a day. During the same period consumption of artificial gas has declined from more than 2,000,000 to about 1,250,000 feet a day, giving the community a combined consumption of more than 2,500,000 feet.

COOKING BY GAS IN THE CLOUDS

The Chrysler Building in New York City, which towers 1,046 feet above the street level, is supplied throughout with gas. Located on the sixty-sixth, sixty-seventh and sixty-eighth floors of this building, 850 feet above the street, is the luxurious Cloud Club, where there is one of the most unusual gas cooking installations of its kind in the world. All cooking and baking is done by gas-fired ovens and ranges, almost a thousand feet above ground.

GAS JETS MAY BE USED IN SMOKE ABATEMENT

ATLANTIC CITY, N. J., May 11.—Accomplishment of the complete combustion of bituminous coal smoke in industrial and commercial uses was announced here at the concluding session of a meeting of the executive board and advisory council of the American Gas Association.

The step is said to be the most constructive toward the abatement and eradication of "smoke palls" that envelop large industrial centers when boiler fires are being started.

The new use of gas as a "smokeless burning" function was said to offer the most practical solution of the smoke-abatement problem as well as making possible greater economy and efficiency in the industrial use of soft coal.

Under the new method, it was said, experiments have successfully proven the practicability of auxiliary gas jets which accomplish the complete combustion of coal dust, reducing the amount of draft required under the fire and materially increasing the steam making capacity.

Prior to adjourning the executive board approved a five-year program of research and development outlined in a schedule of well defined and planned activities. Included in this work will be the study of the change-over from natural to manufactured gas and vice versa taking place or proposed in many sections of the country.

NATURAL GAS SUPPLY FOR 92 ILLINOIS CITIES

SPRINGFIELD, Ill., May 9.—Natural gas will be available to the residents of 92 Illinois cities and villages, according to an order issued by the Illinois Commerce Commission authorizing the construction of a pipe line by the Panhandle Illinois Pipe Line Co.

The company is authorized to construct and operate distribution systems in 47 cities and towns. It may sell gas to other distributing companies in 32 other communities, and to existing gas companies now serving the 13 cities of Jacksonville, Decatur, Danville, Urbana, Champaign, Clinton, Springfield, Peoria, Pekin, Bartonville, East Peoria, Lincoln and Bloomington.

The Panhandle Illinois Co. is a subsidiary of the Panhandle Eastern Pipe Line Co., which is engaged in the construction of a natural gas pipe line from points in Oklahoma, Texas and Kansas through Missouri and Illinois with several laterals in Illinois.

The Panhandle Eastern, it is stated, is capable of delivering approximately 50,000,000,000 feet of gas a year to the Illinois corporation, while the present gas requirements of the largest city to be served in Illinois (Peoria) is but 886,000,000 feet a year, or less than 2 per cent of the quantity of gas which may be delivered to the Illinois company.

"Thus," the commission's order states, "the operations proposed by the petitioner even in reference to the furnishing of natural gas to the existing utilities serving such cities as Peoria, Springfield, Decatur, Bloomington, Champaign, Urbana or Danville, have the aspect of distribution in comparatively small quantities, and at widely separated points, of gas received in much larger quantity and a single point of delivery."

The natural gas reserves from which the Illinois company will receive its supply, the commission found, appear to be sufficient to meet the needs of the Illinois public to be served by the lines for approximately 39 years.

REDUCE ARIZONA RATES

PHOENIX, Ariz., May 9.—Voluntary reductions in rates for gas service in the Salt River Valley territory served by the Central Arizona Light & Power Co., including an optional gas rate on the "therm" basis, have been announced by the State Corporation Commission. The new schedules were agreed upon by the company and the commission at a series of conferences.

EXPECTS GAS SEPTEMBER 1

BOISE CITY, Okla., May 6.—Citizens expect to be using natural gas by September 1. The Panhandle Power & Light Co. has let the contract for construction of its 74-mile natural gas pipe line from Dumas, Tex., to Boise City to Knupp & Fredell of Amarillo. A 6-inch line will be constructed to Stratford and a 5-inch main will carry the gas to the distribution system of the Cimarron Utilities Co., a subsidiary of the Panhandle Power & Light Co.

REPRESSURING OLD FIELD

CHATHAM, Ontario, May 9.—Storing of surplus gas from the Turner Valley in the depleted sands of the Bow Island Field is reported successful. Since the work was commenced last July, approximately 1,100,000,000 feet of gas have been forced into the sands, and repressuring is continuing at the rate of around 5,000,000 feet a day. Practically all this waste gas comes from the wells of the Royalite Oil Co. and the Dalhousie Oil Co.

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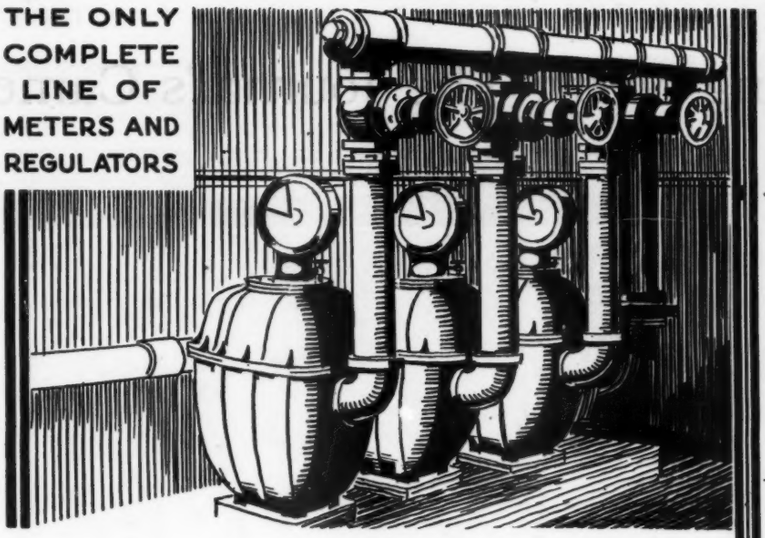

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All moving parts are mounted on one removable casting, the valve plate, making it easier to make repairs in the line. Rolling type diaphragm, patented tangent and valve movement, interchangeability of all parts, diaphragm drains, one piece case construction; all these are features that result in accurate measurement.

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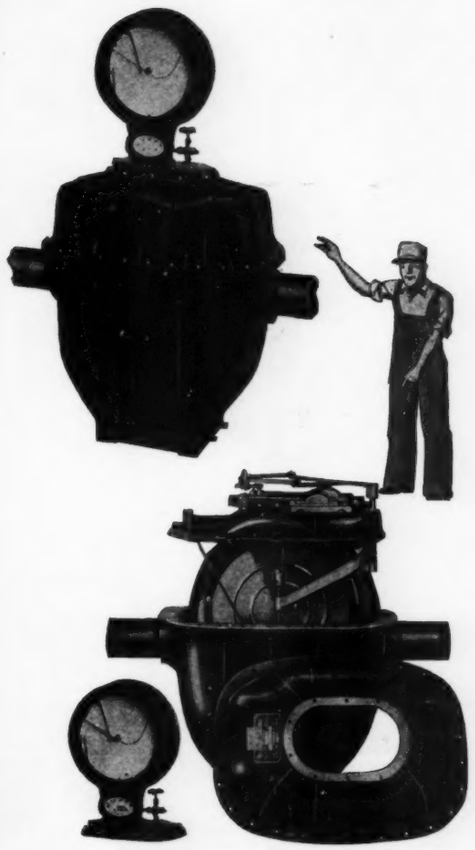

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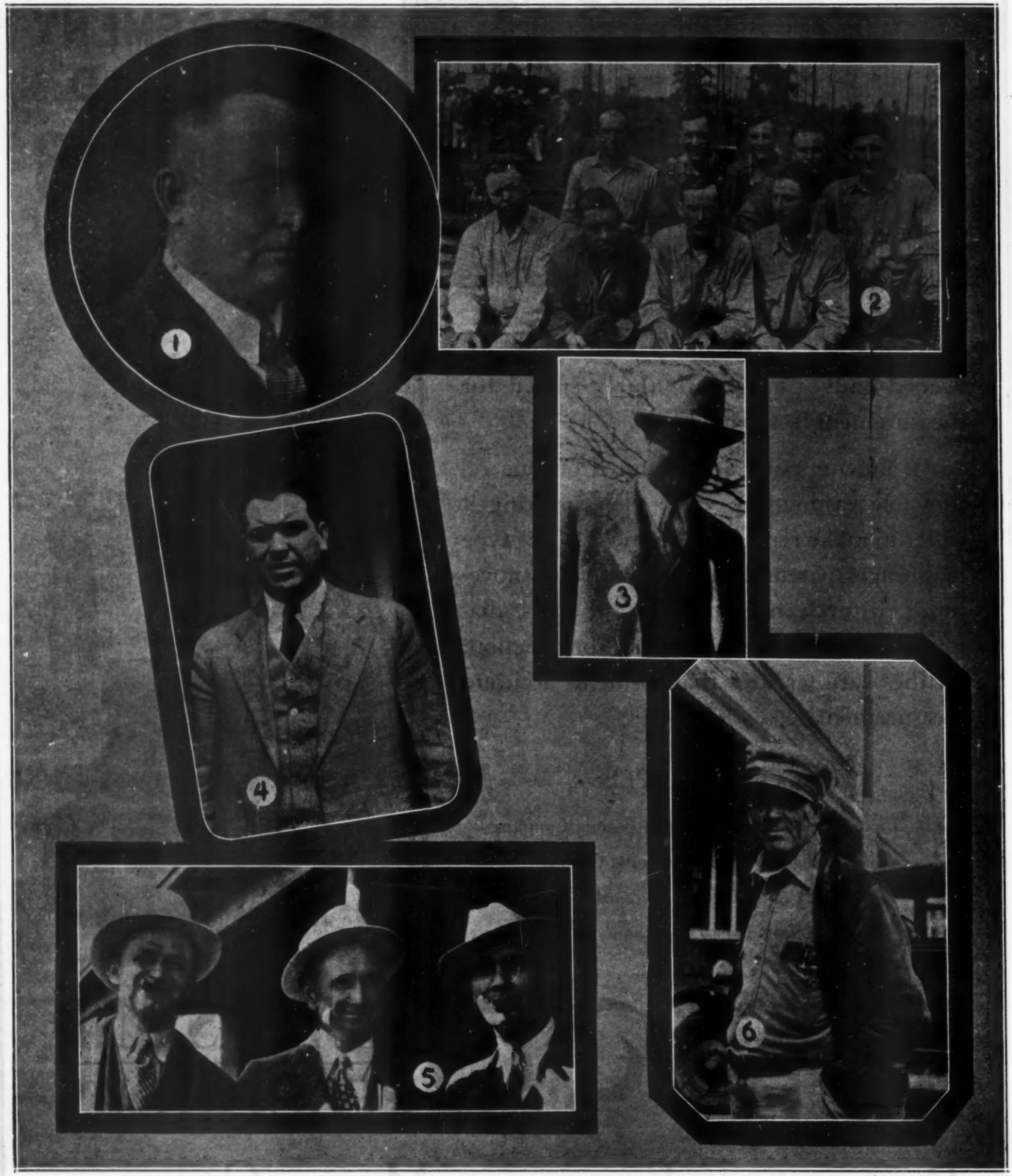
Caught While Scouting With The Journal's Camera



1—R. R. Mills, superintendent, Empire Oil & Refining Company, Ponca City, Okla. 2—Front row, left to right: P. O. Huckaby, W. G. Moore, Jessie Parker and P. G. Lewis. Back row, left to right: Gus Florence, Clyde Mills, J. G. Cook, Buster Florence and Doug Lewis. Crew that drilled first well in Smith County, Texas, Gus Lewis' No. 1 Cooke. 3—Dean Hiatt, superintendent natural gasoline plants, Texas Pacific Coal & Oil Company, Thurber, Tex. 4—H. H. Shaw, chief clerk, material and voucher department, Texas Pacific Coal & Oil Company, Thurber, Tex. 5—J. B. Dalton, The Texas Company; S. M. Gamble, Lone Star Gas Company; and J. E. Fletcher, Eureka Tool Company, all of Ranger, Tex. 6—M. P. Oiler, with Texas Pacific Coal & Oil Company, Thurber, Tex., 41 years.

TEAM-MATES

AUXILIARY BUILDING

Type-22 compressors and also the vertical units meet these requirements. Both Cooper-Bessemer types are thoroughly engineered to the same advanced standards.

When Cooper-Bessemers are specified, you can be sure of easy and dependable operation, accessibility, durability and uniform performance.

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With a manufacturing history which dates back to 1854, Barrett waterproofing products have won wide acceptance for use in underground construction, roofing, roadbuilding and pipe line protection. Barrett Specification Pipe Line Enamel owes its success to this unmatched background of experience. There is a Barrett Specification Pipe Line Enamel to fit each pipe line requirement. And, thanks to Barrett uniformity, and carefully kept records, any orders may be precisely duplicated at any time.

The Barrett Company

40 Rector Street New York, N. Y.

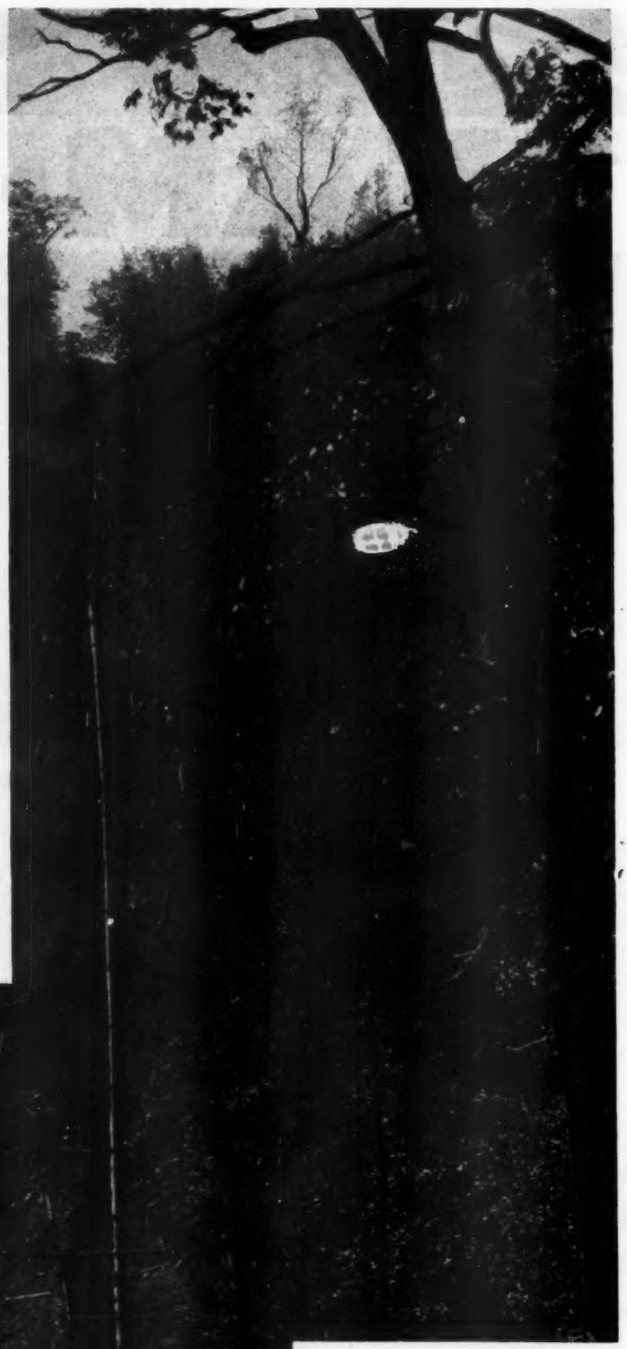
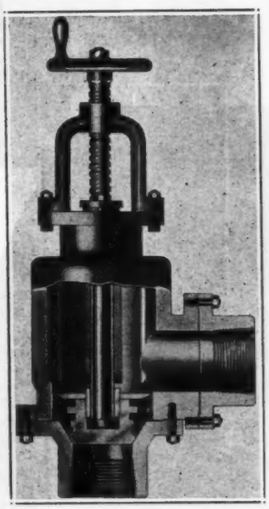


Photo-micrograph shows how flakes of internal reinforcement used by Barrett tend to interlock. They laminate with water-proofing agent and give Barrett Pipe Line Enamel unusual tensile strength and toughness.

Oil Industry Equipment and Supplies

ALL-PURPOSE VALVE IS INTRODUCED BY BRAUER

The new Brauer flow control valve made by the Brauer Machine Manufacturing Co., G. Street, Oklahoma City, is designed as an all-purpose valve. It can



be used on the discharge lines of pumps and will permit the operation of either one or both pumps at the same time. It also makes it possible to compound the pumps when necessary.

It can be used on either a one or two-standpipe hook-up, the fluid flow being handled in any direction desired. Both standpipes can be closed at the same time. Metal-to-metal seat has a rubber seal.

WATER TANK PRIZES AWARDED

Prizes were awarded as follows in the international competition sponsored by the Chicago Bridge & Iron Works, Chicago, to develop an aesthetic improvement in the character of elevated water tanks. First prize of $2,000, Eugene Voita, Chicago; second, $1,000, F. D. Chapman and C. M. Goldman, associated, Evanston, Ill.; and third, $500, Howard W. Vader, Chicago. Honorable mention, carrying a prize of $100 was awarded to Donald A. Blake, Chicago; George A. Hossack, Chicago; Ossip Klarwein and Fritz Hoger, Hamburg, Germany; Mary Ann E. Crawford, Chicago; and Samuel E. Homsey, Cambridge, Mass. The jury of award consisted of R. W. Zimmerman, architect, chairman; Howard L. Cheney, president, Chicago Chapter, American Institute of Architects; and George T. Horton, president of the Chicago Bridge & Iron Works.

BOOK OF PIPE PROTECTION

"The Book of Pipe Protection," published by the General Paint Corp., Tulsa, is got up with a tab marked "Pipe Protection" so that it can be filed in the superintendent's, engineer's or purchasing agent's desk, if desired. The book describes the mechanical application of bituminous coatings and wrappings at the pipe mill. It also contains specifications and price lists for pipe from three-quarter inch to 26-inch, inclusive. Intermingled with the descriptive matter are photographs which show to what extent mill coated and wrapped pipe has been used during the past two and a half years.

NOTES ABOUT TRADE LITERATURE

The Link-Belt Co., Chicago, has issued a folder describing the Link-Belt vibrating screen for reclaiming rotary mud.

Bulletin No. 55, issued by the Joseph Reid Gas Engine Co., Oil City, Pa., is devoted to the Reid type DC two-cycle Diesel convertible engines.

The current number of "Valve Values," published by the Edward Valve & Manufacturing Co., East Chicago, contains a helpful article on testing at high pressures.

"A Saving at Every Turn," is the title of a booklet being mailed by the Link-Belt Co., Chicago, describing seven types of positive drives for the transmission of power.

A composite drawing showing work done in the last year by the United Engineers & Constructors, 125 East Forty-sixth Street, New York, is being distributed by that organization.

The application of aerial photographic maps to the oil industry is discussed in an interesting illustrated booklet by W. H. Wilson, published by the Edgar Tobin Aerial Surveys, San Antonio, Tex.

The Spence Engineering Co., 110 East Forty-second Street, New York, has printed a catalog describing and illustrating the Spence line of equipment, including regulators for various uses.

A folder prepared by the Toledo Pipe Threading Machine Co., Toledo, Ohio, announces a "Toledo" good-tool contest. Thirty-two prizes are offered for letters on "Why Timely Purchase of New Threading and Cutting Pipe Tool Equipment Is Sound Business Practice."

The Consistometer Corp., 332 South Michigan Avenue, Chicago, is mailing a circular describing the "Hot Shot" oil gun for cleaning transmissions and differentials, which the company now is marketing in addition to its Consistometer line.

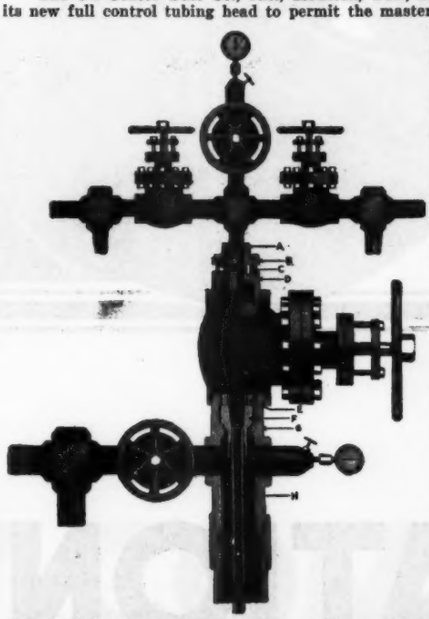
The Brown Instrument Co., Philadelphia, Pa., has published a broadside describing and illustrating its new indicating control instrument for automatically controlling relatively high temperature processes and units such as heat treating furnaces, enameling furnaces, oil stills and towers, galvanizing tanks, etc.

The International Harvester Co. of America, Chicago, has prepared a large profusely illustrated catalog on McCormick-Deering industrial tractor and operating equipment, various types of which designed for operation by McCormick-Deering power are described and illustrated. Names of the manufacturers are listed.

The Gas Products Association, 250 East Ontario Street, Chicago, an organization of independent manufacturers of gas welding and cutting equipment and supplies, has issued a 44-page booklet on pipe welding. It contains in condensed form, information on important phases of the various types of welded steel and wrought iron piping systems for industrial uses.

OIL CENTER ANNOUNCES FULL CONTROL TUBING HEAD

The Oil Center Tool Co., Inc., Houston, Tex., announces it is in production on its new full control tubing head to permit the master gate valve to be closed at any time against pressure, with tubing in the hole, without making any adjustments on the head.



This O-C-T tubing head consists of a swivel connection unit which is screwed into the top of the master gate, a main body, and a tubing hanger which seats in the main body. The swivel connection unit is composed of the parts indicated by the letters A, B, C and D. A is the top outlet, B is the loose-flange ring, C is the bronze or steel seat ring, and D is the top outlet body.

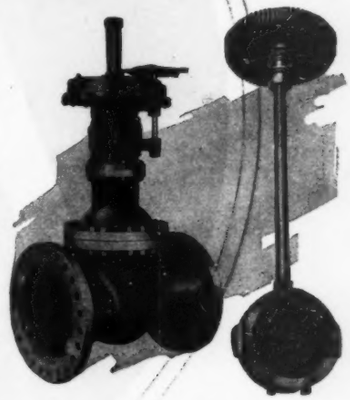
The part indicated by F is the tubing hanger; the letter E indicates the lock ring which locks the tubing hanger in place to prevent it from being lifted off its seat by pressure. G indicates the main body of the tubing head. H indicates the tubing string suspended from the tubing hanger.

The tubing hanger seats on a steel-to-steel ground joint, there being no packing to replace or to burn out in case of fire. The top swivel connection unit is to allow the christmas tree to be swiveled so the flow lines will point in any desired direction. To swivel the christmas tree the bolts in the top swivel connection are loosened. If it is desired to remove the christmas tree it may be lifted completely off, without disturbing any pipe connections, by removing the bolts which hold the swivel connection together.

The O-C-T full control tubing head was designed for either flowing or pumping wells. When it becomes necessary to pump a well, the master gate may be removed and a regular coupling screwed between the main body of the O-C-T head and the top swivel connection.

BALL THRUST BEARING VALVES USED ON LINE

A large number of gate valves like the one shown are being installed in the 1,000-mile 24-inch gas line which will carry natural gas from the Texas fields into Chicago. The working pressure will be 600 pounds. The valve illustrated is



one of many manufactured by the National Machine Works, Chicago, especially for this class of service. It is of cast steel, measures 48½ inches from face to face, has an inside diameter of 16 inches and weighs 5,000 pounds. It has a total lift of 17 inches.

One of the most interesting features of this valve is the use of two Aetna ball thrust bearings. Even with 1,000 pounds pressure on only one side of the valve, it is possible to open and close it with little effort. The thrust bearings are located in the housing, as shown, adding nothing to the total height, and are totally enclosed, being protected against the elements, corrosion, etc.

Another feature is the use of ground discs and seats. The discs of the gate are of high carbon steel. The faces of the seats are of nitro-alloy. Both are accurately ground, assuring a gas-tight contact and freedom from corrosion.

PAPICO HOUSING MAKES CHANGES OF DISC EASY

The Pacific Pipe & Supply Co., Los Angeles, Calif., has placed on the market the Papico orifice disc housing. The fitting is a simple plate container provided with a unique locking device for holding the disc. This housing is used where the meter installation includes a by-pass.

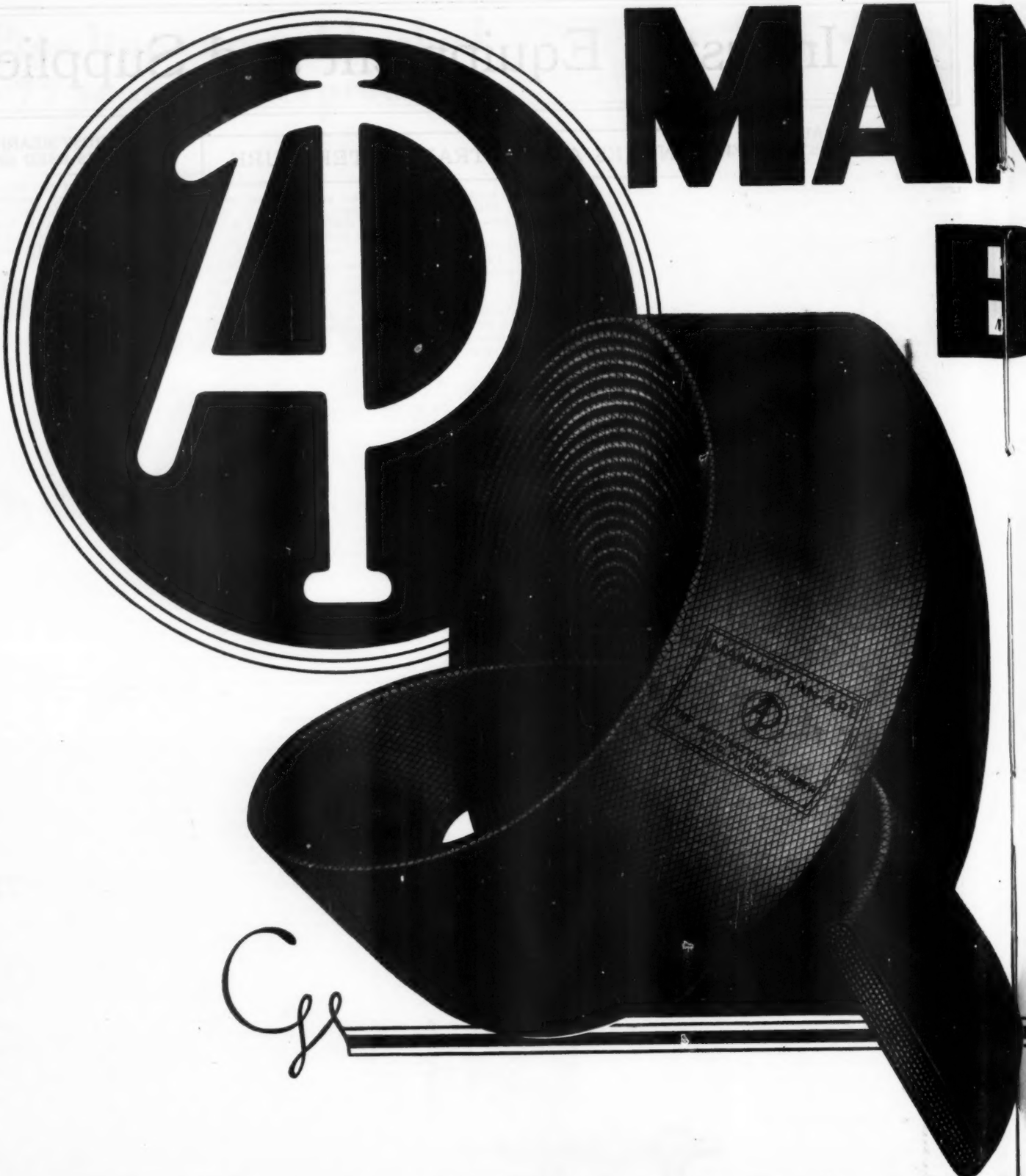
The advantages claimed are that orifice discs may be easily and rapidly changed without having to loosen and take out the bolts of a pair of flanges and then spread them apart either with jack screws or wedges. This feature is of particular value where the line size is large or where the meter run is placed close to a wall or on the ground.

It is not necessary to carry a new style of disc on hand as the Papico housing uses the Robinson type plate.

FOOTE BROS.' BOOKLET IS OUT

The 80-page illustrated booklet just issued by the Foote Brothers Gear & Machine Co., 111 North Canal Street, Chicago, is not only a catalog of the organization's "Hygrade" products, but it contains so much information of interest relating to worm gears that it will be kept as a handbook by many. A history of the evolution of worm gearing prefaces the booklet and a chapter on "The Customer's Problem" contains material of value.

MAN



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SUPPLY COMPANIES

Field Problems and Their Solution

EDITED BY THOMAS F. SMILEY

In order that men connected with the drilling, producing and transporting branches of the petroleum industry may procure quickly a solution of many problems confronting them from time to time in their work, The Oil and Gas Journal has arranged with leading engineers and other recognized authorities to answer questions submitted by readers of this publication pertaining to the work of drilling and producing crude oil and transporting this product.

Everyone is invited to submit questions freely. These questions will be submitted to proper authorities by Mr. Smiley, who edits the page, and answers, based on the best available information, will be published. Each question should give as much detail as possible, especially where it relates to matters where depths of sands, types of sands and operations on adjoining properties would have a bearing on the problem involved. The source of all questions will be considered as confidential and only initials will be published in connection with the question.

In this connection, The Oil and Gas Journal will be glad to publish articles from field men who have devised new methods or practices which are improvements.

In case an immediate answer is important, one will be given by mail if the writer requests it.

HOW ESTIMATE GAS IN AREA?

Your answer to the question of V. D. B. in the Field Problems page of March 26 relative to estimation formulas for the gas reserve of an area of gas-bearing sands prompts me to ask for a solution to the following problem: Assume the rock pressure of a certain area is 750 pounds, which is shown on a 15-minute shut-in test of a well after it has been blown to the air for 30 minutes. After producing 850,000,000 feet of gas the rock pressure taken in the same manner as described is 650 pounds. How will you estimate the total quantity of gas contained in the area before production was started? What is the volume of gas the area will produce before the rock pressure is lowered to 50 pounds, the determination of which is to be made in the same manner as before? I am aware that many local conditions can affect calculations, but I am interested most in the method of calculating the original total volume when the quantity taken from it is known and since also the original and present rock pressure are known in this case.—H. T. O.

Taking into consideration your statement that you realize that many local conditions can affect the calculations, but that you are interested most in the method of calculating the original total volume of gas when the quantity taken from it is known the following answers are strictly mathematical interpretations of the data submitted. Restating the question, you have given:

Original rock pressure, 750 pounds per square inch absolute. Present rock pressure, 650 pounds per square inch absolute. Amount of gas produced from well during this decrease in rock pressure, 850,000,000 cubic feet.

Required: (1) The total quantity of gas contained in the area before production was started. (2) The volume of gas the area will produce before the rock pressure is lowered to 50 pounds per square inch absolute.

Calculations:

$$Q = \frac{V}{14.4}(P_1 - P_2)$$

where

Q is the quantity of gas produced during a decrease in rock pressure from P_1 to P_2.

V is the actual volume of the reservoir in cubic feet at atmospheric pressure of 14.4 pounds per square inch.

P_1 is the original rock pressure, pounds per square inch absolute.

P_2 is the present rock pressure, pounds per square inch absolute.

Therefore:

$$850{,}000{,}000 = \frac{V}{14.4}(750 - 650)$$

or

$$V = \frac{840{,}000{,}000 \times 14.4}{100} = 122{,}400{,}000 \text{ cu.ft.}$$

Following this same line of reasoning the total quantity of gas contained in the area before production was started was

$$Q = \frac{122{,}400{,}000}{14.4}(750) = 6{,}375{,}000{,}000 \text{ cu.ft.}$$

Answering the second question, the volume of gas the area will produce when the rock pressure has decreased from 750 pounds per square inch to 50 pounds per square inch is:

$$Q = \frac{122{,}400{,}000}{14.4}(750 - 50) = 5{,}950{,}000{,}000 \text{ cu. ft.}$$

All of the above computations were made on a slide rule.

Acknowledgement is hereby made to E. L. Rawlins, natural gas engineer for the United States Bureau of Mines, Bartlesville, Okla., for the foregoing solution of this problem.

EFFECTS OF CLOSING WELL

When a producing well is closed for a while and then reopened it sometimes is found that the production shows a loss. What explanation is offered for this? Is there any remedy?—D. S. L.

The loss in production you mention seems to be from causes of rather obscure origin. L. C. Uren advances the suggestion production can be improved by enlarging the hole where it penetrates the oil sand.

S. F. Shaw expresses the opinion that enlargement of the diameter of the well at the bottom would be far more beneficial in increasing the ultimate recovery than the use of back-pressures. Shooting wells has the effect of enlarging the hole, and has given satisfactory results in the Mid-Continent Field. Observations made on several wells in the Seminole area indicated that the gas-oil ratio was lowered when production was increased by shooting the wells.

Mr. Shaw says it is puzzling at times to understand why a producing well that has been closed for a time shows a loss of production when reopened. It seems possible that a readjustment of pressures takes place between the saturated oil sand and the area immediately surrounding the well after the well has been shut in. In this readjustment the gas escapes so slowly from the saturated portion of the sand that the velocity is not sufficient to move the oil toward the well. This movement of gas will continue, however, until pressure equilbrium is established, even though there may be no movement of the oil.

PREVENTION OF CHANNELING

In operating a group of properties in Wilbarger County, Texas, where production is found at a depth of 1,850 feet from a sand having an average thickness of 20 feet, with fairly uniform texture and little water, a repressuring program has been under way for about six months. Natural gas produced from casingheads is sent through a compressor and injected into the sand. To prevent channeling of gas from well to well and in order to continue gas injection under oil proration measures, back pressure is being held on certain wells adjacent to injection wells, so that pressure can be built up in the sand over a wide area while the property is prorated. This back pressure is applied at well heads in the form of gas pressure. In most publications concerning repressuring projects it appears that back pressure is maintained on certain wells by means of raising tubing so that the fluid level will be higher, rather than by exerting back pressure with gas at the casinghead. I should like to know what the consensus of opinion among engineers is as to the relative advisability of using these two methods of maintaining back pressures on a producing sand to prevent channeling during a repressuring program. Also I would like to have a bibliography on repressuring.—E. M. S.

A bibliography on the subject of repressuring is being sent to you. A few articles on repressuring have been published since this list was prepared. "Repressuring in Red River Oil Field," by Tom L. Coleman, district engineer, United States Geological Survey, Wichita Falls, Tex., was published in the March 19, 1931, issue of The Oil and Gas Journal.

This department is unable to give you the consensus of opinion of engineers on the two methods you outline for holding back pressure on wells as this would require a symposium or joint meeting of engineers to discuss the merits of the different methods, and it is doubtful if they would agree even then.

You have good authorities on this matter in your city, and if you will submit your problem to them in all details they can give you reliable opinions, something which engineers at this distance would not care to undertake without full information of the operations you have in mind.

You might also get valuable information from Ben E. Lindsly, United States Bureau of Mines, Bartlesville, Okla., who has done repressuring work in the Nowata district, Oklahoma, and has told about some of his results in bulletins for the Bureau of Mines.

WHY WAS IT CALLED THAT?

FIVE SPOT

The familiar card used in playing poker, bridge, pitch, pinochle, and similar games for passing away time and ready cash provided the designation "five spot," used to indicate the additional well drilled on a 40-acre tract originally developed by four wells placed in the center of each of the 10-acre plots forming the four corners of the lease. This fifth well usually is located in the center of the 40-acre tract, thus forming a pattern suggesting the five spot of the euchre deck.

PIPE LINE CORROSION COSTLY

If corrosion attacks pipe lines to the extent indicated by articles I have been reading the total cost of the loss from this source must be terrific and it seems to me it would be common sense to have an official investigation of the subject with a view of finding the best means of applying a remedy. Is it possible to approximate the total cost of corrosion to the various industries that own pipe buried in the ground? Has there been anything more than independent study of the subject here and there?—O. S. E.

An investigation such as you evidently have in mind was begun about eight years ago by the Bureau of Standards and is being carried on still. K. H. Logan, electrical engineer in charge of the bureau's underground corrosion section, is overseeing the investigation and public utility organizations are co-operating with him.

More than 300,000 miles of pipe line is buried in the United States and it is estimated that the loss from corrosion on this pipe is in the neighborhood of $100,000,000 annually. Much of this loss can be prevented by the proper selection of pipe materials and the application of suitable protection to the lines in corrosive soils. The purpose of the Bureau of Standards underground corrosion section is to co-operate with the owners of underground utilities such as water, gas and oil lines in the reduction of these losses caused by corrosion.

With the assistance of public utility organizations, the Bureau of Standards is undertaking to determine the causes of underground corrosion, methods of identifying corrosive soils, the characteristics which a satisfactory pipe coating must have, and methods for ascertaining whether a coating is suitable for a given soil condition. The American Gas Association, the American Petroleum Institute, the Underground Pipe Protection Institute and independent manufacturers of protective coatings are working with the bureau in this investigation also.

In each of the 100 locations where field tests are being conducted local public utility companies furnish the test plots and the labor for burying and removing specimens. In addition 50 manufacturers co-operate by furnishing considerable quantities of their materials for the test.

Nearly 20,000 specimens of materials, comprising several kinds of iron, steel, brass and copper pipe, a variety of alloys intended for service under special conditions, and a large number of metallic and organic coatings are under observation. Tests are being conducted in nearly all parts of the United States where pipes are extensively used. The work began with the burial of specimens of iron and steel pipe for the purpose of determining the extent and seriousness of soil action. From time to time the number of test locations and the variety of specimens have been increased as the need for information became more fully appreciated.

At two-year intervals some of the specimens of pipe are removed and returned to the bureau for study. The rates at which they lose weight and at which pits deepen are determined. When sufficient data have been collected, it will be possible to predict the life of the several pipe materials in various soils and to determine which materials best adapted to any local condition. These data and corresponding data on the behavior of protective coatings will enable the engineer to select the most economical protection for new pipe lines and old ones that have to be reconditioned. Reduction of the cost of maintaining lines should result in reducing the cost of fluids which the lines transport.

I am interested in learning more about the complete line of Axelson Pumps and Sucker Rods

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HOW DO YOU MEASURE PUMP EFFICIENCY?

LOOK AHEAD!

A straight edge will determine the length of the pump; micrometers, the diameter; scales, the weight; but only far-sighted vision can measure pump efficiency. Pumping efficiency is satisfactory service in terms of years. Cheap pumping equipment is false economy. Axelson equipment is not cheap in price but is the best economy when pumping efficiency is measured.

High-grade materials, expert workmanship, modern equipment behind the Axelson organization are responsible for the prominent part Axelson pumps and sucker rods play in the oil industry from the standpoint of economical production.

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These are but a few of the economy advantages of BLACKOR. There are many others you should know about. Ask for your copy of latest Catalog, containing complete details about BLACKOR and its money-saving electrical method of application.

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Blackor is a black, granular, hard-facing material made from the highest-grade Tungsten. Does away with insert materials. Carbon-arc applied. Patented.

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The Super Abrasion-Resistant Facing

Technical Questions Answered

BY CHARLES K. FRANCIS, PH.D., TECHNICAL EDITOR

This department of The Oil and Gas Journal is devoted to the manufacturing branches of the oil industry.

Those connected with the refining of crude petroleum, the manufacture of natural gasoline and closely allied industries are invited to submit their problems to Dr. C. K. Francis, technical editor. The department was created for the purpose of aiding managers, superintendents, engineers, chemists and all those engaged in the various phases of plant operation; also those connected with the marketing and utilization of petroleum products.

Questions should be submitted in as much detail as possible so as to assure a satisfactory answer.

All inquiries should be signed and if other than the given initials are to be used please indicate the desired letters.

Questions involving patented processes, intricate formulas and calculations and estimates of costs, for obvious reasons, cannot be answered. The replies will appear on this page within a reasonable time.

FRACTIONATING TOWER

What kind of a fractionating column is that illustrated in The Oil and Gas Journal, February 12, 1931, Page 109?—M.F.

The tower illustrated is a part of the refining system as designed by the Pure Oil Co. The entire system was fully described in The Oil and Gas Journal, February 17, 1927, Page 38, by C. L. Smith. The following description of the tower is quoted from this source:

"The towers used on the tube still installations are approximately 70 feet high, 8½ feet in diameter and have two T-shape connections 8½ by 16 feet long. One of these is at the bottom of the tower and forms a reservoir with large vaporizing surface for the oil which is refluxed to the bottom of the tower. In this section a reboiler coil can be conveniently installed if desired. The other 'T' section is about 16 feet from the top of the tower and contains a heat exchanger or refluxing coil of conventional design, with which the tower outlet temperature is controlled. In several years of service it has never been necessary to replace a single tube in one of these refluxers.

"The fractionating space between the refluxer and the reboiler is filled with trays of a special design. These trays are made up of narrow steel stampings of trough design, so designed that they contain a fluid level and at the same time present the maximum amount of surface for vapor contact. The standard tube still towers contain more than 70 of these trays. Placed at intervals between the trays are distributing pans, designed to prevent the vapors and reflux from channeling. Above the refluxer there are a few trays, and above these specially designed baffles which act as separators for removing entrained liquids from the vapors. The entrained liquids so removed are drained back into the fractionating section.

"The trays in the fractionating sections of these towers maintain constant fluid levels throughout the tower, the total liquid so retained being in excess of that held on the trays in other standard towers. This fluid content of the fractionating sections permits of finer control, as it is necessary to vaporize or cool a large amount of liquid in order to obtain any great temperature changes in the tower. The vapor to liquid contact is positive, but at the same time, on account of the open character of the tower, friction caused by the vapors rising through the rain of reflux from the trays is almost negligible."

STABILIZATION OF NATURAL GASOLINE

What is the stabilization process used in the manufacture of gasoline from natural gas? When was this process first used?—R. B. T.

Many gasoline plants were for many years so operated that large quantities of extremely volatile gasoline were made. The reason for this being that the extraction of the hydrocarbons from the gas was carried to the extreme, so that a large part of the low boiling members of the paraffin hydrocarbons were included in the resulting gasoline. Excessive pressures and unnecessarily low temperatures were largely responsible for this. Because there were no recognized standard specifications for this kind of gasoline it was natural to run the plants for volume production and then endeavor to market the product. The demand increased for less wild material, as the most volatile portions were called, and the operators made some progress by weathering this product. This consisted in permitting the gasoline to evaporate under atmospheric conditions in a tank until the most volatile portions escaped through a vent and the bulk of the gasoline reached some predetermined gravity. Weather conditions and seasonal changes made it impossible to make a uniform product by this method.

This difficulty was brought under plant control in 1921 by the use of fractionating towers, following the practice of refiners, which could be controlled as to temperature and pressure at the top and bottom. The vapors leaving the tower at the top were compressed, then condensed, and the required quantity of the resulting gasoline expanded back into the top of the tower to produce the required low temperature. A reboiler or kettle at the bottom of the tower serves as a still to accomplish the necessary fractionation. This process, which may be operated to furnish a uniform product throughout the year, has become known as stabilization.

The stabilization process means more complete separation of the several hydrocarbons found in a gas; the fractionation being sharper than the former weather process could effect. By this process it is possible to separate the most volatile portions, the fixed gases such as methane and ethane, from the intermediate hydrocarbons propane and butane, and finally the gasoline fraction including pentane and heavier.

OSTWALD INDEX NUMBER AND QUALITY INDEX

Can you tell me what is the Ostwald Quality Index of a gasoline, and especially where information about this index may be obtained?—N. C. H.

There have been several references to Ostwald index number in the literature. A few of these may be mentiond: Pt. Times, No. 332, 884, 1925. Auto, T. No. 9, 10-12, 1925. Pet. Zeit. 1925, 1,323; 1926, 678; 1926, 850; 1927, 445. See Chem. Abs. 20, 1,311, 1926. J. Instn. Pet. Tech. 1930, 489A.

The differences between boiling point curves as given by various types of standard apparatus and procedures have led to the use of a constant obtained by a rough integration of the boiling point curves themselves. Adding the temperatures representing the distillate volume percentages and dividing the sum by 10. The method is not applicable when different kinds of liquids are present. The following constants have been proposed: 96-104, motor benzine; 112-120, high-test gasoline; 126-128, average gasoline; 140, U. S. Navy gasoline quality. The constant makes possible a grading of such fuels with respect to their behavior upon boiling and also enables one to make calculations concerning mixtures of fuels to be made. An indication of the behavior of a motor fuel in an internal combustion engine may be determined from the paraffin content and Ostwald's index number. From these the behavior of the fuel can be indicated by an index number. The relation:

$$\text{Quality index} = \frac{\text{aromatics} + \text{naphthenes}}{\text{Ostwald's index number}}$$

offers a simple means for ranking motor fuels according to their tendency to knock.

QUALITY INDEX AND EQUIVALENTS

Fuel mixture plus benzol %	Ricardo H.U.C.R.	Paraffins	Quality index O. index No.	Quality index
10	5.25	56.5	136.0	0.320
20	5.36	50.0	131.5	0.380
40	5.82	37.5	122.0	0.512

"Unsaturated hydrocarbons form only a very unimportant part of straightrun gasolines and are unobjectionable in the motor. A chart is given which develops the index number graphically, using as a basis a benzol-toluol mixture, having an index number of 100. The position of the gasolines with the same quality index number on different levels gives information upon the combustion value and the consumption for the same knock resistance. Of two such gasolines, the one having the smaller Ostwald index number has the advantage of greater economy."

PLAIN DEFINITION OF OCTANE NUMBER

Will you please be so kind as to give us your interpretation and version in ordinary plain everyday oil-man language of the derivation and meaning and purpose of so-called octane numbers in the determination of the antiknock content of various gasolines?—P. W. B.

Wealth is commonly measured in terms of dollars, wheat by the bushel, coal by the ton, etc. The bushel of wheat and the ton of coal are definite units of measure in the United States because they have been standardized, that is defined, by law. Wealth may have many meanings, and even the ordinary money equivalent will vary with the times and people, so it is an indefinite term.

As advances were made in the development of the automobile engine it was discovered that with efforts to increase the power of an engine gasolines of apparently identical physical properties did not behave in the same way when used as a motor fuel. That is, the gasoline on the market was an indefinite thing. When power was demanded of the motor it was frequently observed that a definite knocking occurred. This knock was found to be caused by peculiar conditions of combustion that were related to the fuel.

Investigations soon demonstrated that the tendency to produce a combustion knock in the motor varied to a great extent with the gasoline. Some gasolines are nearly free from this property, while others are such bad knockers that they are a source of annoyance and responsible for poor performance. Now that this fact is known it is important that some method should be devised for detecting the knock and that some distinct term be selected which would serve as a yard stick for measuring the knocking tendency of motor gasolines.

The method adopted for detecting the knock is by trial in a suitably modified engine, charging the sample in question alternately with a fuel of known knock value. The selection of something to give this known knock value has required several years of research and discussion. The solution of the problem has appeared in the use of two substances, one of which is free from knock while the other knocks far worse than any known gasoline. The one free from the knocking tendency is the hydrocarbon octane, and the bad knocker is heptane. Mixtures of these may be made to duplicate or match the knocking property of any gasoline; the natural proportion for blending these to make the mixtures is on a percentage basis. This has been done and the term octane number has resulted. The octane number of a gasoline being the percentage of octane mixed with heptane that when tested in the modified engine will knock to the same extent as the sample. This rating should be stated in whole numbers such as 58 or 60, etc.

See The Oil and Gas Journal, April 23, 1931, page 79.

PIERCE JUNCTION CRUDE OIL ANALYSIS

Would you kindly give me an analysis showing the composition of the crude oil from the Pierce Junction Pool?—R. L. S.

The Pierce Junction oil represented in the analysis following was produced at 3,850 feet in Harris County, Texas. This analysis is from Bureau of Mines, R.I. 2,416, page 47, 1922, by Smith, Bauer and LeJeune.

ANALYSIS PIERCE JUNCTION OIL

Gravity A.P.I.	22.1
Specific gravity	0.921
Sulphur, per cent	0.29
Water	Trace
Viscosity Saybolt at	
70° F.	209 sec.
100° F.	106 sec.
Naphtha	None
Kerosene	None
Gas oil, per cent	36.2
Gr. 29.3 A.P.I.	
Lub dist., per cent	16.4
Gr. 19/22 A.P.I.	
Vis. 50/100	
Lub. dist., per cent	5.8
Gr. 18/19 A.P.I.	
Vis. 100/200	
Viscous lub dist., per cent	13.8
Gr. 15.4/18.1	
Vis. above 200	

The above analysis is from report by Smith, Bauer and LeJeune, Bureau of Mines, R.I. 2,416, page 47, 1922.

Another analysis from one of the refineries operating on this crude is:

Gravity A.P.I.	26.3
Specific gravity	.8967
Vis. at 100° F.	136
Flash	95°F.
Sediment and water	0.6
Sulphur	0.26
Color	Dark green

YIELD

Product—		Per cent
Naphtha		9.5
Gravity	51.3	
Sulphur	0.057	
Octane No.	68	
Off at 212°	9	
284°	52	
Max. 375°		
Burning oil		33.0
Gravity	33.9	
R.O. Vis.	475	
Flash	150°	
Sulphur	0.062	
Gas oil		23.2
Gravity	24.4	
Flash	226 P.M.	
Sulphur	0.20	
Lub. dist.		30.0
Gravity	20.4	
Vis. at 100	602	
Flash	365	
Fire	430	
Sulphur	0.30	
Bottoms		14.7
Gravity	15.1	
Vis. at 210	930	
Flash	605	
Fire	630	
Sulphur	0.54	

CROSSING THE MISSOURI

The site of the Missouri River Crossing of the Kansas City-Chicago Gas Line constructed by the Continental Construction Corporation. The lines of J & L Seamless Line Pipe come down the bluff on the Nebraska side, are carried across the river, and emerge on the Iowa bank. The two crossings (each five 10-inch lines) are about 300 yards apart.

1 *One of the two manifolds from each of which five 10-inch lines of J & L Seamless run.*

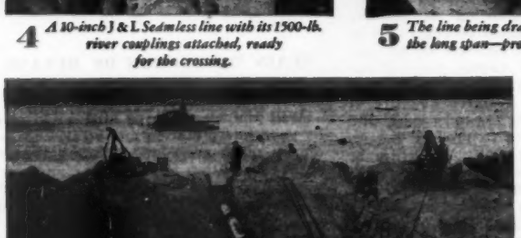
2 *A 10-inch line of J & L Seamless dropping over the bluff, down to the river bank.*

3 *J & L Seamless on the bank, prepared for the crossing. Note coating, and lugs welded on for attaching river couplings.*

4 *A 10-inch J & L Seamless line with its 1500-lb. river couplings attached, ready for the crossing.*

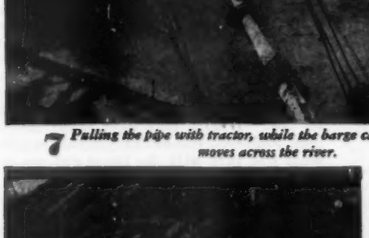
5 *The line being drawn out to the barge. Note the long span—proof of outstanding strength.*

6 *View of shore end of line, ready for the weld of another length. Dredge is trenching river bed.*



7 *Pulling the pipe with tractor, while the barge carrying the end moves across the river.*

8 *View showing various shore trenches. Tractor is engaged in pulling one line of pipe.*



9 *The union completed. Welders joining the two ends of a crossing line.*

10 *The first completed line across the river, on the Iowa shore.*

JONES

J&L STEEL

RIVER

WITH J & L SEAMLESS LINE PIPE

WHEN the gas line constructed by Continental Construction Corporation from Kansas City to Chicago was being installed, the Missouri River crossing at Plattsmouth, Nebraska, presented a major engineering problem, which demanded the utmost of the men, methods and materials involved. The river is a quarter of a mile wide, and 35 feet deep. The current is 7 miles per hour. Continuity of service is a prime essential.

The 24-inch main was led, by a series of manifolds, into ten 10-inch lines of J & L Seamless Line Pipe, which were laid across the river bed, each in a separate trench. Individual sections of each ten-inch line were welded together, and the 1500-pound river couplings attached. The purpose of these couplings is to weight the line and prevent it from being floated by the current. The end of the line was then picked up by a barge. Tractors equipped with winches pulled the pipe into the river, the barge at the same time moving across the stream. Additional sections were welded on as pulling continued, until the crossing was completed and each line connected with its corresponding line on the other bank.

This crossing represents an outstanding engineering achievement, and an exceptionally severe test of the J & L Seamless Line Pipe used—a test which it passed with flying colors. The successful use of J & L Seamless Line Pipe for this work is a high tribute to its strength and durability, a convincing testimonial to its acknowledged worth.

CASING DRILL PIPE · TUBING LINE PIPE · J&L PIPE · SEAMLESS · WELDED

& LAUGHLIN STEEL CORPORATION

AMERICAN IRON AND STEEL WORKS

JONES & LAUGHLIN BUILDING, PITTSBURGH, PENNSYLVANIA

Sales Offices: Atlanta Boston Buffalo Chicago Cincinnati Cleveland Dallas Denver Detroit Erie Los Angeles Memphis Milwaukee Minneapolis New York Philadelphia Pittsburgh St. Louis San Francisco Washington

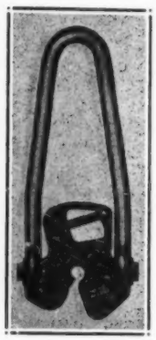
Warehouses: CHICAGO CINCINNATI DETROIT MEMPHIS NEW ORLEANS PITTSBURGH

Canadian Representatives: JONES & LAUGHLIN STEEL PRODUCTS COMPANY, Pittsburgh, Pa., U. S. A., and Toronto, Ont., Canada

Oil Industry Equipment and Supplies

SUCKER ROD ELEVATOR HAS USEFUL FEATURES

The Oil Well Supply Co.'s new and improved Imperial sucker rod elevator was designed to embody simplicity, strength and convenience. There are few parts and all are easily accessible. All working parts are protected against clogging from paraffin or dirt. The Imperial elevator will carry the longest string of rods, according to the manufacturer.



Convenience of operation is an outstanding feature. Rods after stabbing cannot be released except at the will of the operator. No extra motion is needed to release the latch. "Squeeze" the handle and disengage the elevator. Protection for the operator's hand and a thumb brace are provided. This elevator will accomplish economy and speed in the handling of sucker rods. Made in two sizes, ⅝"x¾" and ¾"x⅞". All parts for both sizes are interchangeable except the finished body.

Features of the Imperial sucker rod elevator are enumerated as follows by the manufacturer: (1) All-steel, heat-treated, hardened. (2) Balanced, light, easily handled. (3) Reversible, either side is up. (4) Both faces flat, will rest firmly on tubing tee or guide. (5) One working part only. (6) Wide mouth to throat, easily engaged from either vertical or horizontal position. (7) Easily disengaged by a slight pull toward operator, ample hand space with right or left-hand thumb brace. (8) High tensile strength, much stronger than rods being pulled. (9) Long life, rods will not wear body because body is carefully and scientifically hardened. (10) Bail rests restrict bail from dropping down on wrong side of well. Bail rests likewise permit bail to be placed in a semiupright position for engagement with sucker rod hook.

ALUMINUM TRUCK TANK UNIT

An all-aluminum truck tank unit weighing less than a pound per gallon of pay load recently was delivered to the Humble Oil Co. by the Standard Steel Works of Kansas City, Mo. This truck tank and trailer unit, comprising a train with a capacity of 6,493 gallons, now is in daily service. Every useless pound of metal was stripped from it by the engineers and designers. It is one of a dozen or more all-aluminum units delivered in the last year by the Standard Steel Works. The same company also has produced several all-steel units with a deadweight of 1¾ pounds per gallon of pay load, a reduction of almost 50 per cent from previous figures.

OXYGEN BREATHING APPARATUS

The Mine Safety Appliances Co., Pittsburgh, Pa., announces that the McCaa one-half hour self-contained oxygen breathing apparatus has been officially approved by the United States Bureau of Mines for safety, practicability and efficiency in general service. The apparatus furnishes respiratory protection in oxygen deficient and highly concentrated gaseous atmospheres.

McCaa apparatus of the two-hour type is widely used in rescue and recovery operations. The half-hour apparatus is now widely used industrially where respiratory protection is required for short periods.

AMONG THE EQUIPMENT HOUSES

As a result of changes at various points within the organization of the Westinghouse Electric Supply Corp., G. B. (Bud) Fisher has been transferred from Tulsa to the Oklahoma City office.

The Pittsburgh office of the Bristol Co., Waterbury, Conn., has been moved from the Frick Building to the Koppers Building.

The Lucey Products Corp. has been appointed distributor in the oil industry for Jenkins valves, Scotch gauge glasses and other control equipment manufactured by Jenkins Brothers, 80 White Street, New York.

The Inland Iron Works Co., Okmulgee, Okla., has purchased the Okmulgee plant of the United Iron Works, Inc., the personnel of which will be retained. The general office of Inland will be in Okmulgee, with sales offices in that city and Tulsa.

At the organization meeting of the board of directors of the Westinghouse Electric & Manufacturing Co., the following officials were elected: A. W. Robertson, chairman of the board; F. A. Merrick, president; J. S. Tritle, vice president in charge of manufacturing; S. M. Kintner, vice president in charge of engineering; W. S. Rugg, vice president in charge of sales. L. A. Osborne, H. P. Davis, H. D. Shute, J. S. Bennett, H. T. Herr, Walter Cary, T. P. Gaylord, and Harold Smith were re-elected vice presidents. C. H. Terry was elected an honorary vice president. E. M. Herr was re-elected vice chairman.

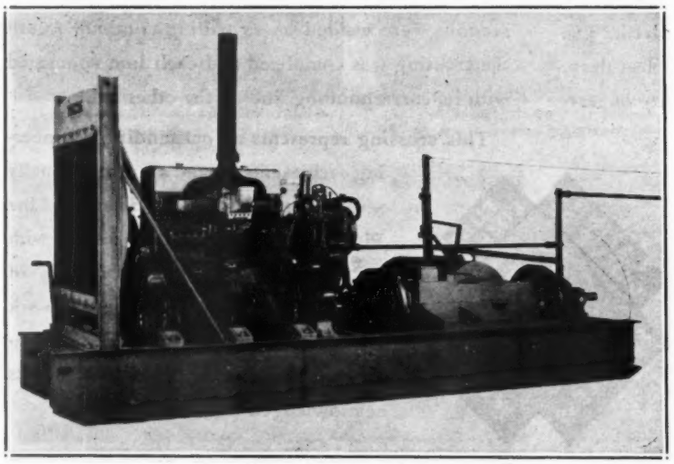
The Link-Belt Co., Chicago, has made William L. Hartley district sales manager in charge of the Detroit territory. Mr. Hartley has been with Link-Belt since 1915, having started in the engineering department.

M. B. MacNeille has resigned from Fairbanks, Morse & Co. and joined the sales organization of the Dayton-Dowd Co., manufacturer of centrifugal pumps, Quincy, Ill., and will act as western sales manager with headquarters in San Francisco.

C. G. Wennerstrom, former chief engineer of Foote Brothers Gear & Machine Co., has joined the Universal Gear Corp. organization, 327 South LaSalle Street, Chicago.

Byron Jackson Co., Berkeley, Calif., announces the return of W. R. Layne to its sales force as petroleum pumping engineer, after an absence of a year. Prior to Mr. Layne's connection with Byron Jackson he spent five years in the engineering department of the Standard Oil Co. of California as a pump specialist.

YOUNG INTRODUCES PORTABLE DIESEL DRILLING UNIT



Drilling with Diesel engine power, while not new, has received added impetus through the introduction of a portable drilling unit by the Young Engine Corp. of Canton, Ohio. Foremost among the advantages which appeal to users of cable tool drilling rigs are the savings which can be made.

The power plant of the Model 120D Young drilling engine is a Buda M.A.N. D 4-30 6½x8¾, four-cylinder, four-cycle type. The motor construction is such that it may be operated on either two or four cylinders. This permits using the power at the highest point of efficiency by cutting out two cylinders when running light and holding in reserve the other two for such times as full power is needed. To facilitate starting, a small air-cooled gasoline engine is mounted to the frame in a way similar to a starting motor. As soon as the large motor is in motion the small engine cuts out.

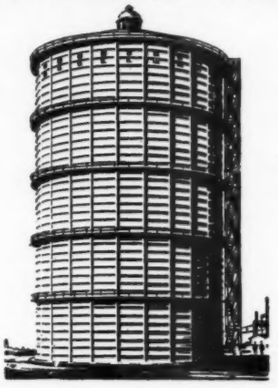
The transmission is the same unit as used with the "Improved Big Boy." A cast case encloses the spiral-cut, alloy-steel, heat-treated noiseless gears which are mounted on six Timken bearings, two adjacent to the forward clutch, two at the rear and two on the bevel gear shaft.

The clutches are connected so that it is impossible to throw in either one without releasing the other. By an ingenious link arrangement a brake is applied as one clutch disengages and automatically releases as either clutch is thrown in. The brake is unusually rugged with a drum 20 inches in diameter and a 5-inch face.

One of the outstanding features in addition to economy of operation is the mobility of the unit. Self-contained on a rugged structural steel welded frame, it requires only a light, inexpensive foundation and can be moved from place to place with practically no time lost in dismantling. The narrow frame is especially an advantage on hillside operations.

STACEY BROS. TO BUILD WATERLESS GAS-HOLDER

The Syracuse Lighting Co., Syracuse, N. Y., has awarded to the Stacey Brothers Gas Construction Co. of Cincinnati,



Ohio, the holder division of the Stacey Engineering Co., a contract for the fabrication and erection in Syracuse of a 6,000,000-cubic foot Stacey-Klonne waterless or piston gas holder.

There are 30 Klonne holders in service or under construction in Germany, France, England, Belgium, Holland, Czecho Slovakia, Italy, Switzerland and Africa, the oldest of which have been in service five years. The accompanying illustration shows the general exterior appearance of the Stacey-Klonne waterless gas holder, which is cylindrical in form for its full height with a cone roof surmounted by a turret.

The interior of this holder is provided with a movable piston beneath which the gas is stored, the height of the piston varying as the volume of the gas increases or decreases within the holder. The circular form of the shell and piston permits the flexible expanding sealing ring, carrying the packing and mounted on the outer perimeter of the piston, to accommodate itself to the shell with a minimum of resistance to slight variations or distortions caused by wind or heat.

The numerous carriage wheels installed at the top and bottom of the triangular structural frame secured to the top of the piston for guiding it are made of wood or special composition having similar characteristics.

The piston is sealed against the shell of the holder by several layers of an especially prepared lubricated packing, mounted on the flexible expanding sealing ring, making the holder gas tight without the necessity of maintaining a liquid seal with head in excess of the gas pressure, and eliminating the pumps, heating and treating apparatus necessary to maintain such a liquid seal.

CHAINS EMBODY NEW FEATURE

Baldwin Deep-well Super-service chains now are made with the new solid cotter and patented retainer or cup, taking the place of ordinary cotter-pins formerly used. This makes for easy assembly and disassembly and eliminates shearing of cotters. The chains embody the Baldwin straight side-bar construction, alloy steels being used throughout. The links and rollers are heat-treated. The pins and bushings are case-hardened and afterward ground to exact size. The pin is of 5 per cent nickel steel, keyed into one of the side bars and press-fitted into both. A bulletin, No. 37, describing these chains, may be obtained from the manufacturers, the Baldwin-Duckworth Chain Corp., Worcester, Mass.

Granger Leak Indicator Supplants These Old Methods

Below We Describe the Several Time-Wasting and Laborious Methods Now Rendered Obsolete

Crew has examined all valves and found same in good condition and has determined that loss in production is due to either a collar leak or a pressure split.

Back Filling

The tubing is now pulled and inspected, but the leak is so small it is not visible. A standing valve is now used to close the bottom of the tubing. Then the stand (90 feet of tubing) is run back into the well. It is then filled with water to put pressure on the defective point, which is presumably in these three joints. (Note: The leak is actually in one of these three joints, the crew being ignorant of this fact. In actual operation one of these three joints was leaking under 1500 lbs. pressure per square inch.)

The crew now fills these joints with water; pulls the stand up into the derrick and examines each collar and the surface of each joint under 45 lbs. of water pressure. Because this is not enough pressure to open the leak, they are forced to continue this futile operation with each successive stand. It is not until 3000 feet of tubing are run in that the leak starts to open again.

Again the crew has to pull all of the tubing and again wipe collars and examine the surface for a leak. The resultant decrease in fluid pressure again causes the leak to close, and naturally cannot be found. Therefore another method has to be tried.

Steaming Method

Tubing is all pulled and in the derrick. A steam connection is rigged up and each stand is steamed, inspected and run in. The leak is not apparent because the 100 lb. steam pressure is not enough to open leak. It will be remembered that no leak showed up in the back filling process until 3000 feet of tubing had been run back in, which then applied 1500 lbs. pressure on defective point in tubing. They now try the

Steaming

Color Method

Crew start tubing back in, filling each stand as it is run in. Again the defective point opens up after 3000 feet of tubing are run in and 1500 lbs. pressure is reached. Color is now run in and settles down as the fluid leaks out. The fluid level outside of tubing has risen until the leak is submerged in oil. Color goes out of tubing and the oil, boiling from active gas, spreads the color up and down tubing. Crew pull tubing and find color covering extensive surface, and again do not locate leak. The tubing is again run in and another old method is tried. This is the third day and the

Examining Collar

Chopped Rope Method

is tried. Again 3000 feet of tubing is run in and chopped rope is put in; and, since this is a collar leak, the chopped rope stops up the leak and makes the tubing tight. The rope cannot get past the threads. The tubing fills up and runs over. The crew pull all the tubing and find no evidence of chopped rope sticking through leak. Believing it to be a collar leak, the crew start in and unscrew every collar and examine threads, painting each collar with lead and discarding suspicious looking collars, until the 3000 feet of tubing have been run back in well.

Chopping Rope

The leak has been corrected even though not exactly located. Four days of labor, four days of loss of production, plus loss of materials used, has been the monetary cost of stopping this leak.

INDICATOR CO.

Mid-Continent Branches

320 E. 11th St., Tulsa, Oklahoma—120 Main St., Seminole, Oklahoma

R. L. MELTON, Mgr.

Solubility of Natural Gas in Crude Oil

Preliminary Report on Investigation of the Bureau of Mines Determining These Values for Oil and Gas From Natural Reservoir

By Ben E. Lindsly
Senior Petroleum Engineer, United States Bureau of Mines, Bartlesville, Okla.*

Petroleum engineers generally are familiar with the investigations of Dow and Reistle, Beecher and Parkhurst, and Dow and Calkin relative to the solubility of natural gas in crude oil. Since the publication of the results of those investigations and the work of Mills and Heithecker, little additional knowledge on this interesting and important subject has appeared in the petroleum engineering literature.

The reports of Beecher and Parkhurst and Dow and Calkin agree substantially. The data from both investigations showed that, under the conditions of the tests, the solubility of natural gas in crude oil increased in direct proportion to the pressure at which the gas was put into solution, and the solubility decreased to a considerable extent with increased temperature. These facts, and others relating to the changes in viscosity, surface tension and specific gravity of the crude caused by the solution of gas in the oil, have been given due consideration in the petroleum industry, and the recognition of these facts has resulted in a great improvement in the technique of producing oil.

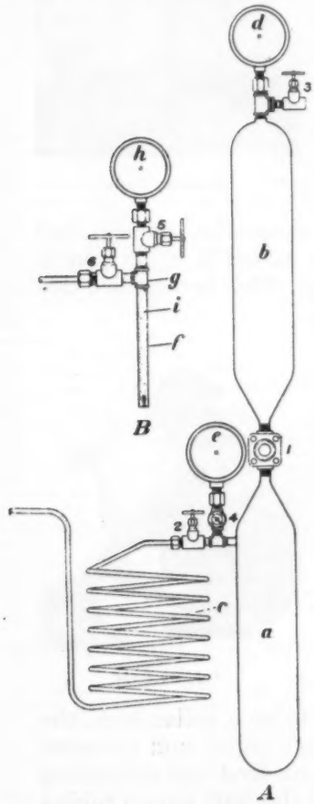


Figure 1—High-pressure sampling apparatus. Separator "B" replaces "b" in laboratory operations.

A—High pressure sampling apparatus. B—The separator. Replaces b in laboratory apparatus. a—Lower sampling bomb 3½"x 15". b—Upper sampling bomb 3¼"x15". c—Copper coil leading from high pressure connection at well head, to a .¼" O.D. d—Pressure gauge. Determines pressure of sample. e—Auxiliary pressure gauge. Indicates leaks after sampling. f—Hydraulic nipple ½"x6". g—Hydraulic tee ½". h—Pressure gauge. Indicates pressure when dissolved gas is liberated. i—BB shot used as packing in separator. 1—Lubricated high pressure stop cock ½". 2—Inlet. Forged steel needle valve ½". 3—Outlet. Forged steel needle valve ¼". 4—Needle valve. Forged steel ¼". 5—Needle valve. Forged steel ¼". 6—Separator outlet. Needle valve. Forged steel ¼".

However, in these first experiments, various grades and types of weathered crude oil were contacted at various pressures up to 500 pounds per square inch gauge with gases deficient to a considerable degree in the heavier hydrocarbons, as compared with the gas that was originally in solution in the oil in its natural underground reservoir. The amount of dissolved gas that was liberated upon reducing the pressure to 1 atmosphere was measured. For these reasons, the complete significance of the effect of dissolved gases in crude oil, as it occurs in nature, cannot be determined directly from the data obtained under the conditions of the test as described.

In the present investigation, well-head samples were obtained in suitable bombs at existing well-head pressure from flowing wells, and the amount of gas that was liberated upon gradual reduction of pressure was measured and analyzed. Samples under a pressure as high as 1,686 pounds per square inch absolute were obtained.

Difference in Data

The difference in data obtained under the two general sets of conditions can be shown best by the following comparisons: Beecher and Parkhurst found that weathered Bradford crude of 44.3° A.P.I. gravity dissolved 70 cubic feet of dry natural gas per barrel of oil when the two substances were contacted under pressure up to 300 pounds per square inch gauge. The author, working with Kettleman Hills crude of 44.5° A.P.I. gravity, found that a well-head sample liberated 275 cubic feet of dissolved gas when the pressure was reduced through a corresponding pressure range. The difference of 205 cubic feet between the results of the two studies cannot be attributed to the fact that one crude was from California and the other from Pennsylvania, but rather to the different methods, as explained, which were employed in making the determinations.

In the application of experimental data obtained from weathered oil and dry natural gas, there is no doubt that the results of calculations reflecting the changes in the physical properties of natural oil-gas mixtures have been correct in trend, but it now appears that the numerical values of these calculations may have fallen short in magnitude. The fact that live oil obtained at the well-head contained greater quantities of dissolved gas than oil that had been in storage for some time was indicated to the author by his experiments on Burbank crude, which showed that 78 cubic feet of gas per barrel of oil were liberated from solution in the oil when the pressure was reduced from 2 pounds per square inch gauge to 26 inch vacuum; a reduction in absolute pressure of about 15 pounds, giving a final pressure of about one-tenth the original pressure. On the other hand, Dow and Calkin found that it required 378 pounds per square inch, or about 27 times their original pressure (which was atmospheric) to dissolve the same quantity of dry natural gas per barrel of weathered Oklahoma crude, which had a gravity of 31° A.P.I.

These great differences in the volume of gas that is in solution naturally in crude oil, as compared with the volume of gas that will dissolve in weathered oil when it is contacted with dry natural gas at high pressures artificially, indicate that many fundamental data regarding the solubility of gas in oil in the natural state are yet to be obtained.

This preliminary paper gives the major findings of a study of the Bureau of Mines which is being made to obtain data on the physical and chemical characteristics of natural oil-gas mixtures. By proper interpretation, it is believed that these data will indicate true solubility conditions in natural reservoirs.

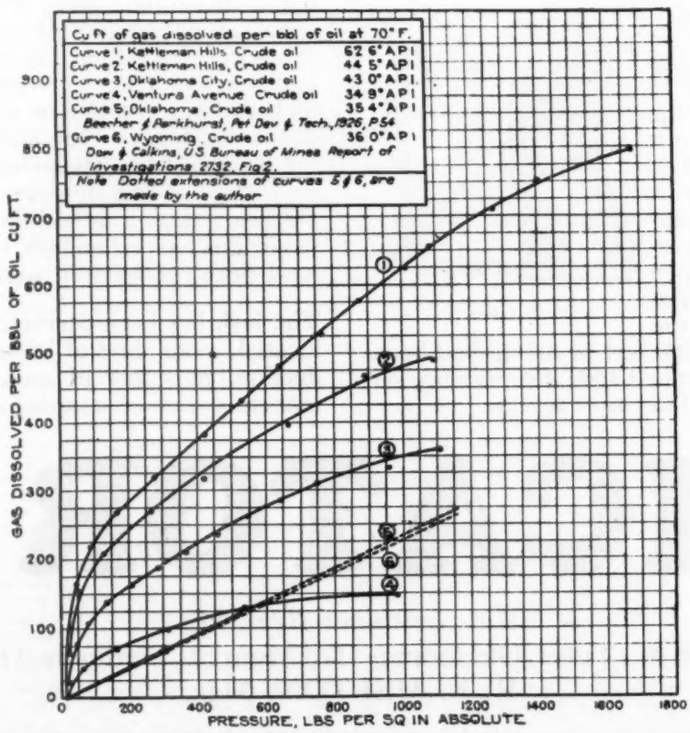

Cu ft of gas dissolved per bbl of oil at 70° F.
Curve 1, Kettleman Hills, Crude oil 62.6° API
Curve 2, Kettleman Hills, Crude oil 44.5° API
Curve 3, Oklahoma City, Crude oil 43.0° API
Curve 4, Ventura Avenue Crude oil 34.9° API
Curve 5, Oklahoma, Crude oil 35.4° API
Beecher & Parkhurst, Pet Dev & Tech, 1926, P.54
Curve 6, Wyoming, Crude oil 36.0° API
Dow & Calkins, U.S Bureau of Mines Report of Investigations 2732, Fig 2.
Note Dotted extensions of curves 5 & 6, are made by the author
GAS DISSOLVED PER BBL OF OIL CU FT
PRESSURE, LBS PER SQ IN ABSOLUTE
0
100
200
300
400
500
600
700
800
900
200
400
600
800
1000
1200
1400
1600
1800

Figure 2—Solubility curves of various crude oils.

Apparatus and Procedure

Figure 1A shows two high-pressure bombs connected by a half-inch lubricated stopcock (1). These bombs are forged from 3-inch double extra heavy seamless tubing. Their outside and inside diameters are approximately 3½ and 2¼-inch, respectively. The wall thickness, therefore, is approximately five-eighths inch. The length of each bomb is about 15 inches and the capacity of the lower bomb (a) including the port of stopcock (1) is approximately 705 cubic centimeters. All parts of the apparatus were tested to 2,500 pounds per square inch hydraulic pressure. Valve (2) connected at the side of bomb (a) is the inlet valve and valve (3) at the top of the upper bomb (b) is the outlet. These are forged steel needle valves. Valve (2) is connected to a coil of quarter-inch copper tubing (c) that leads to the connection at the well head. The assembled bombs and copper tubing are placed in a 70° F. water bath, and the apparatus is then subjected to the well pressure by opening valve (2). After examining the apparatus carefully for leaks, valve (3) is opened slightly, and, with lubricated stopcock (1) connecting the two bombs open, the oil and gas flow through the copper coil and the bombs at well-head pressure under flowing conditions. The oil drops to the bottom of bomb (a) and the gas discharges from the top of the upper bomb (b). This operation is continued until oil discharges with the gas from needle valve (3). After the oil has discharged from the top of needle valve (3) for about 10 minutes, this valve and also the inlet or lower needle valve (2) are closed, the copper tube is disconnected and the assembled bombs are allowed to remain in the 70° F. bath for 15 or 20 minutes, thereby allowing any gas bubbles that may be adhering to the walls of the bottom bomb to pass upward through stopcock (1) and rise to the top of the upper bomb. During this stabilizing process, the lower bomb is vigorously hammered at frequent intervals in order to jar loose any gas bubbles which may have adhered to the sides of the lower bomb.

Pressure gauge (d) indicates the pressure at which the sample is taken. Pressure gauge (e) is for the purpose of indicating leaks that may be present after the sample is obtained. Thus during the sampling operation, valve (4) is closed and remains closed until the sampling is complete. At that time, valve (1) is closed and valve (4) is opened. Leaks in the apparatus become apparent by a more or less continuous pressure drop, as indicated by gauge (e). Gauge (e) was highly important in the experiments at the Oklahoma City Field, where a number of samples were taken at one time, packed in ice and transported to Bartlesville, Okla., a distance of 200 miles, where they were placed in cold storage for periods varying from a few days to two or three weeks before the gas was drawn off into measuring bottles. In the California work, however, only one sample was taken at a time, and as bombs (a) and (b) were allowed to remain assembled during the short period of transportation from well to laboratory, any pressure drop that might occur could be readily observed on gauge (d). Consequently, under these conditions, there was no advantage in using gauge (e).

In preparing the apparatus and the

(Continued on Page 146)

*Before 1931 annual meeting, A.I.M.E. Published by permission of Director, United States Bureau of Mines.

Bottom Hole Pressures in Oil Wells

These Data Now Recognized as Fundamental in Determining the Most Efficient Methods of Recovering Oil

By C. V. Millikan[1] and Carroll V. Sidwell[2]*

There is nothing more important in petroleum engineering than a definite knowledge of the pressure at the bottom of an oil well at any existing operating condition, and the relation of this pressure to the pressure within the producing formation. A knowledge of bottom-hole pressures is fundamental in determining the most efficient methods of recovery and the most efficient lifting procedure, yet there is less information about these pressures than about any other part of the general problem of producing oil.

Determination of Bottom-Hole Pressures

Bottom-hole pressure may be calculated or determined by several methods. On an active well it may be calculated from the fluid head, or, if the well is shut in, by adding the casinghead pressure, the static head of the gas, and the fluid head. In wells flowing naturally through tubing the pressure at the bottom of the tubing may be calculated by adding the pressure at the casinghead between the tubing and the casing and the pressure due to the weight of the column of gas, but there is always possibility of error caused by fluid being in the annular space above the bottom of the tubing. If a well with tubing is flowing through either the annular space or the tubing, sufficient gas may be injected through the static space to insure that it is free of fluid but not sufficient to establish an appreciable friction loss. The pressure at the bottom of the tubing can then be calculated by adding to the pressure at the tubing head, the pressure due to the weight of the column of gas. This is probably the most accurate method of calculating bottom-hole pressures. In wells flowing by gas lift, the pressure at the point the gas enters the flow may be calculated by a gas flow formula.

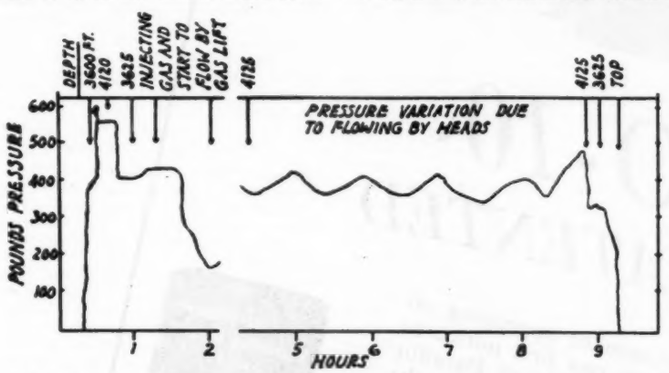


Figure 2—Chart from a well producing on gas-lift, with instrument at the bottom of the hole while gas was being injected. The pressure increased at the time gas injection was started, and dropped when the well started flowing. Note the pressure variation caused by flowing by heads.

Several Types

Several types of pressure bombs have been used to measure the pressure at the bottom of wells. One is a piece of steel tubing with a check valve in the bottom and a connection for pressure gauge at the top. It is lowered into the well to the point at which the pressure is desired then brought to the surface and the pressure read from a pressure gauge put on the top connection. Several bombs have been made which enclose a maximum reading pressure gauge. Some use a maximum indicating pointer, but this is not as satisfactory as a stylus on the pointer scratching a smoked surface. Consideration has been given to electrical instruments which, on being lowered into a well, give a continuous reading at the surface, but so far as is known, this method has not yet been developed to practical use. A recording gauge built up with a common gauge pressure element, recording on a small circular clock-driven chart, has been used some, but its use is limited because of its large diameter and difficulty of close reading. Another recording gauge is being developed by which the pressure is determined with a piston and spring, on the same principle as a steam indicator gauge, and another obtains the pressure from a fluid filled tube with elastic walls.

Pressure Gauge

The Amerada pressure gauge was used in determining the bottom-hole pressures considered in this paper. It was developed in the laboratory of the Geophysical Research Corp., under the direction of Dr. F. M. Kannenstine. A cross-sectional drawing of the instrument is shown in Figure 1. The gauge consists of three main parts: Clock, chart-carrier and pressure element. The clock is of special design, having a diameter of 1⅜ inches and an over-all length of 7 inches. The carrier holds a chart 7 inches long and 2⅞ inches wide. The movement of the chart is obtained by a central screw operated by the clock. This screw drives the chart carrier downward so that its weight almost balances the friction thus reducing the power demand on the clock. The pressure element consists of pressure element tubing, fabricated into a spiral coil seven-eighths inch in diameter and 7 inches long. The lower end of this tube is soldered to an opening in the base, which extends to the outside of the bomb. The upper end is sealed and attached to a shaft to which is also attached an arm and brass stylus for recording on a metallic faced paper chart. The entire instrument is built on a frame which fits into a steel case, and as it is run into the well is 41 inches long, 2 inches outside diameter, and weighs 25 pounds. It is usually run on a steel wire measuring line.

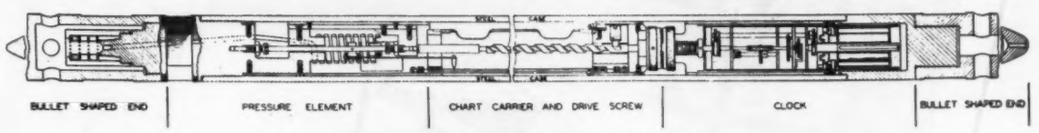


Figure 1—Amerada pressure gauge (cross section).

Speed Clocks

Five different speed clocks have been made which will run the full length of a chart in 1, 3, 12, 24 and 48 hours. Pressure elements of various ranges may be used. The lowest range used thus far has a calibration of 75 pounds, and the highest has a calibration of 1,100 pounds per square inch of movement of the stylus. Temperature correction in most cases may be neglected. The chart reading will be approximately 1 pound lower for each 65° F. increase in temperature. Although this instrument appears to be quite delicate, service in the field has proven it very rugged.

Charts Taken

Five charts taken in producing wells are reproduced in Figures 2 to 6 inclusive. The pressure scale and notes showing depths of readings and some of the changes in the well which caused a change in pressure have been added. The chart shown in Figure 2 was made in a well producing by gas lift, flowing between 2½-inch tubing and 7-inch casing. The bottom of the tubing was 3,602 feet and the top of the sand at 4,124 feet. Readings were taken near these depths before gas was injected to start the well flowing. The pressure of 558 pounds recorded at 4,120 feet was considered as the pressure in the producing formation. The pressure at the bottom of the tubing increased 26 pounds after starting to inject gas probably due to the weight of the gas under pressure. During the last five hours of the chart the well was flowing by heads at the rate of 1,560 bbls. per day, with an input volume of 940,000 feet and a trap volume of 1,600,000 feet per day. The chart shown in Figure 3 was taken in a well flowing by heads at the rate of 580 bbls. of oil per day from 3,935 feet through 8⅝-inch casing. The formation pressure at the top of the pay zone was 1,520 pounds. The rate of gas production which is plotted simultaneously with the pressure at the bottom of the hole was obtained with an orifice meter, using a fast meter chart. The time, pressures and gas volume were repeated with marked regularity during each flow. The chart reproduced in Figure 4 was taken in a well that had been flowing by gas lift, but was shut down at the time the chart was taken and still had a tubing head pressure of 224 pounds. The increase in pressure due to the weight of the column of gas is recorded down to 3,750 feet where the pressure was 257 pounds. From the pressure increase in fluid between 4,000 feet and 4,070 feet and the pressure increase from the top of 3,750 feet in gas, the point at which the gauge went into fluid is calculated at 3,830 feet. When the tubing pressure was released the pressure at the bottom temporarily dropped

(Continued on Page 154)

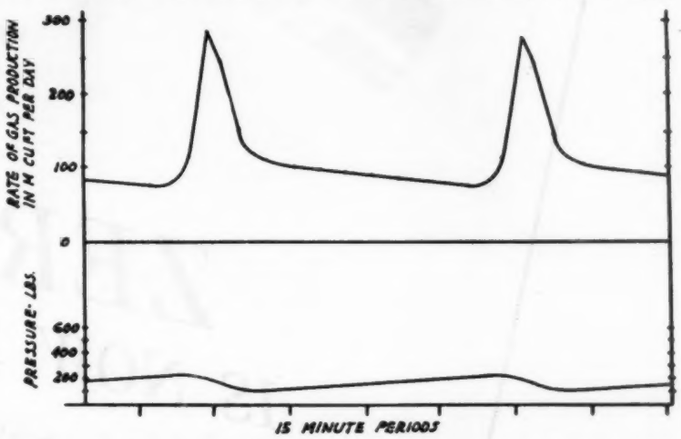


Figure 3—Pressure change in the bottom of a well flowing naturally by heads. Also rate of gas production on same time scale.

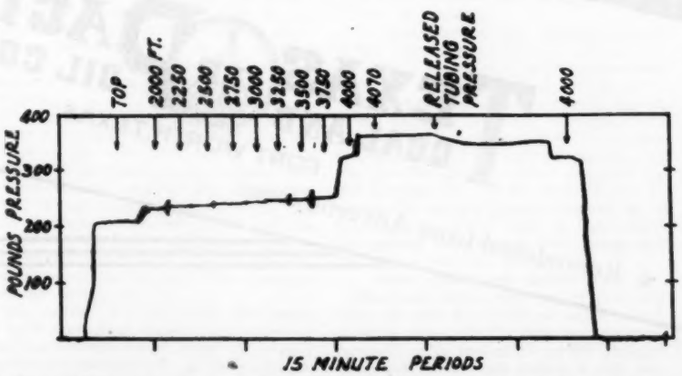


Figure 4—The pressure increase down to 3,830 feet is due to weight of the gas column. Below 3,830 feet increase due to fluid head.

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*Before 1931 annual meeting of A.I.M.E.

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Fire	510 570
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Color	0 5NPA
Carbon Res.	Under 1

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METHODS OF TESTING METERS IN THE FIELD

(Continued from Page 60)

tached to the line, the differential across the orifice is obtained between the tap one diameter upstream and a tap eight diameters downstream. If the gas is discharged into the atmosphere, the downstream connection is omitted, in which case the upstream pressure is the differential and the downstream pressure is the atmospheric pressure.

The meter is tested at the maximum rate by using a larger orifice between the flanges and obtaining the same data as for the check rate.

The following information is required: (1) Differential in inches of water, (2) pressure at eight diameters downstream from orifice in inches of mercury absolute, (3) temperature at outlet of flow prover, (4) specific gravity of gas, (5) standard time for 1 cubic foot, (6) time required for the passage of a definite number of cubic feet index reading of field meter, (7) difference between the pressure at the inlet of the field meter and the pressure at the upstream side of the orifice of flow prover.

All of the data required are obtained at the time of the test with the exception of the specific gravity. In many cases the specific gravity is constant. When the specific gravity varies, the factor for specific gravity may be obtained by the method given in the following paragraphs, but when it varies rapidly from hour to hour, this method is not suitable.

The pressure factor, the temperature factor and the specific gravity factor are multiplied together to obtain the combined factor. This factor is multiplied by the increase in the index reading and the product by the standard time of the orifice to obtain the correct gas time. The proof is equal to the test time divided by the correct time.

Specific Gravity Factor

If the specific gravity of the gas at the field meter is not known, a small meter equipped with a small low-pressure orifice at the outlet may be used as a means to determine the specific gravity factor. The time required for the passage of 1 cubic foot of air at the test pressure is obtained by a test at the shop. The time required for the passage of 1 cubic foot of gas at the test pressure is obtained by a test at the field meter. The factor for specific gravity is equal to the gas time divided by the air time.

For example, if, when making the test with air the barometric pressure is 29.6 inches and the temperature is 65°, the test is made at a differential pressure of 8.00 inches. If, when making the test with gas, the barometric pressure is 29.5 inches and the temperature is 70°, the test is made at a differential pressure of 7.90 inches. If the gas time is 21.5 seconds and the air time is 25.0 seconds, the factor for specific gravity is equal to the gas time divided by the air time, or 0.860.

In making this test it is desirable to pass the gas until the temperature of the gas flowing through the small meter is the same as the temperature of the gas flowing through the field meter.

Size of Small Orifice

The size of the small orifice should be such that the flow of air through the small meter will not produce a differential greater than 0.5 inch of water. If the small meter is equipped with fittings for increasing the size of the outlet to 2 inches, the flow meter with the 0.21-inch orifice may be used to determine the air time at the shop and the gas time at the field meter.

On each return of the small meter to the shop, the meter and orifice should be tested with air to see that the proof of the meter is not changed. It is not necessary that the proof of the small meter be correct, but the proofs at the open rate and check rate should be the same.

The 0.21-inch orifice may be used for the check-rate test. The 1.13-inch orifice should be used for testing a meter at a rate of about 3,600 cubic feet an hour.

The accuracy of the flow-prover method depends upon the standard time which is stamped on the discs by the manufacturer, and upon the care with which these discs are handled in the field. When handled with care the values should not change. The differential should be maintained at a constant value and should be read to the nearest 0.02 inch, as a difference of 0.1 inch of water in the average differential reading will produce a difference of three-fourths of 1 per cent. The temperature of the outlet gas should be obtained to the nearest degree, as a difference of 1 degree makes a difference of 0.1 of 1 per cent.

Difference of 1 Degree

A difference of 1 degree between the temperatures at the meter and the outlet of the flow prover will make a difference of one-fifth of 1 per cent. A difference of 1 inch of water pressure between the inlet of the meter and the inlet of the flow prover will make a difference of one-fourth of 1 per cent.

The gas should be turned on very slowly, especially if the pressure on the upstream side of the inlet gate is high, and the meter allowed to run for a few minutes prior to starting the test. The test should not be made until the temperature at the outlet of the prover is constant.

An inspection of all joints or connections between the inlet of the meter and the prover should be made. Small leaks between the inlet of the meter and the orifice will have an effect on the test. In testing for leaks use a large brush and soap suds. When the flow prover is connected to a tee at the outlet of a meter, be sure that the outlet valve does not leak and allow some gas to return from the outlet line and pass through the prover. Be sure that the gas does not leak around the gasket on the inlet side of the orifice disc during a test.

For the same reasons, given under the test-meter method, this method is not desirable for use in testing meters at high pressure.

Critical Flow Prover Method

The apparatus used in the critical flow prover method, consisting of a 2-inch extra heavy steel nipple, a pair of special flanges equipped with hook bolts and thumb nuts, five orifice discs, a stop watch, and thermometer, weighs approximately 13 pounds. When packed in the carrying case it weighs approximately 21 pounds.

Each of the orifices is marked on the outlet side with the standard time in seconds required for the passage of 1 cubic foot of air at line pressure (when the absolute downstream pressure is less than one-half of the absolute upstream pressure) and the temperature is 60° F.

The correct time for the passage of 1 cubic foot of gas (index reading) is obtained by multiplying the standard time by the factors for the temperature, the ratio of specific heats and the specific gravity of the gas, which are given in the accompanying tables.

The stop watch is used to obtain the time required for the passage of gas for one or more complete revolutions of the proving hand of the index. The test time should not be less than 100 seconds.

This method is based upon the principle of critical flow which is: When the absolute downstream pressure is one-half or less than one-half of the absolute upstream pressure, the quantity in cubic feet expressed at the upstream pressure passing through the orifice is constant.

For example, if a quarter-inch orifice having a correct time of 4 seconds is installed at the outlet of a meter under a pressure of 15 pounds gauge or more (30 pounds absolute) and the pressure at the outlet of the orifice is atmospheric, the time required for an increase of 100 cubic feet in the index reading of a correct meter will always be 400 seconds, regardless of the value of the constant pressure during the test.

The prover is attached to the meter or to a connection close to the outlet of the meter between the meter and a gate on the downstream side of the meter. A small orifice is placed between the flanges for the check-rate test. The valve on the upstream side of the field meter is adjusted to maintain a constant pressure at the field meter. Note the time required for the increase of index reading and the temperature on the upstream side of the orifice.

The meter is tested at the maximum rate by using a larger orifice between the flanges and obtaining the same data as for the check rate.

Information Required

The following information is required: (1) Specific gravity; (2) ratio of specific heats of gas; (3) temperature at upstream side of orifice of flow prover; (4) standard time for 1 cubic foot of air; (5) time required for the passage of a definite number of cubic feet index reading of field meter.

All of the data required are obtained at the time of the test, with the exception of the specific gravity and the ratio of specific heats of the gas. In many cases the specific gravity is constant. When the specific gravity varies, the factor for specific gravity may be obtained by the method given in the following paragraphs.

The value of ratio of specific heats is dependent upon the composition of the gas. Its value for gas delivered from any field or district is usually constant. When the factor for specific gravity is obtained as above mentioned, the factor for the ratio of specific heats and temperature is obtained at the same time.

The examples in form contain the data from two tests. The standard time of the orifice is multiplied by the increase in index reading, and the product by the factor for specific gravity, and this product is multiplied by the factor for the temperature and ratio of specific heats to obtain the correct gas time. The proof is equal to the test time divided by the correct time.

The value of the ratio of specific heats is about 1.31 for dry natural gas and 1.28 for gas discharged from casinghead gasoline plants.

Standard Air Time

The standard air time for two or more orifices used in parallel is equal to the reciprocal of the sum of the reciprocals.

$$t_s = \frac{1}{\frac{1}{t_1} + \frac{1}{t_2} - \text{etc.}}$$

in which

t_s = standard air time for 1 cubic foot for two or more critical-flow orifices.

t_1, t_2 = respectively, standard air time for each individual orifice.

If the standard air time for one orifice is 4.50 seconds and for another orifice is 2.00 seconds, the air time for the two orifices when used on a tee at the outlet of the prover is

$$\frac{1}{\frac{1}{2.00} + \frac{1}{4.50}} = 1.385.$$

When testing meters at a rate greater than 6,000 cubic feet an hour it is advisable to use two or more critical-flow orifices in parallel. By the use of a tee with two nipples, two orifices can be placed in parallel.

In cases where the specific gravity varies from time to time during the day, and where the ratio of specific heats may vary, the following method may be used.

A small high pressure meter (25 pounds gauge working pressure) equipped with a small critical flow orifice at the outlet may be used for determining the factor for the gas. The time required for the passage of 1 cubic foot of air at about 15 pounds gauge pressure at a temperature of 60° can be determined by passing air through the meter and the orifice into the atmosphere.

Same Meter and Orifice Used

The same meter and orifice are used with the gas at the larger meter which is to be tested. If the time for the passage of 1 cubic foot of air at 60° through the small meter and orifice is 100 seconds, and the time for 1 cubic foot of the gas at line pressure and temperature is 80 seconds, the combined factor (for temperature, specific gravity, and specific-heat ratio) for the gas is 0.80. The correct time for 1 cubic foot of gas passing through any orifice is equal to the standard air time for the orifice multiplied by the factor as determined by using the small meter and small orifice.

This method will reduce the number of calculations to a minimum and will give correct results as long as the small meter and small orifice are tested with air and the proof of the small meter does not change between tests.

The orifice discs furnished by the manufacturer are stamped to indicate the time required for the passage of 1 cubic foot of air under standard conditions. These values should not change except for corrosion, abrasion, or rough handling. When made of stainless steel there is very little likelihood of change of values unless they are used for testing gas containing foreign matter, and therefore should be examined after each test to be sure that no foreign matter has collected in the throat of the orifice.

It is desirable that the critical flow prover be installed as close to the outlet of the field meter as possible, as each inch of difference in pressure between the inlet of the field meter and the inlet of the critical flow orifice prover will produce a difference of 0.1 of 1 per cent at a pressure of 20 pounds. By using a special form prepared for data, the test may be made as routine procedure.

Precautions to Be Observed

There are a few precautions which should be observed when using critical flow orifices. The temperature of the gas should be measured at the inlet to the orifice. The gas should be passed through the meter and prover until the temperature is constant. The pressure at the field meter should be maintained fairly constant during the test. If the pressure on the meter is not the same at the end of any test as at the beginning of any test, an error will exist on account of the change of quantity or weight of gas in the displacement meter produced by the change in pressure.

An inspection of the joints or connections between the inlet of the meter and the prover should be made. Small leaks between the inlet of the meter and the orifice will have an effect on the test. Test the thermometer connection for leaks. When the flow prover is connected to a tee at the outlet of a meter, be sure that the outlet valve does not leak and allow some gas to return from the outlet line and pass through the prover.

If a regulator or partially closed valve is located on the upstream side of the meter, the test should not be conducted until the temperature of the gas at the outlet of the meter is the same as at the inlet.

The orifice discs should be handled very carefully. When not in use they should be kept in a case or wrapped in a cloth to prevent the edges from becoming damaged or dirty.

It will be noted that the equipment required for the critical flow method is very limited and that this method may be used for testing the meter at the pressure at which it is used. It thus eliminates the necessity of assuming that a meter which is correct at low pressure will be correct at higher pressures. This method of testing is not suitable when the gas contains any free liquid.

Choice of Method

The method which is the most desirable to use in any particular case depends upon the location of the meter, whether the gas can be discharged into the main, the pressure of the gas in the line, capacity and type of meter under test, space available for installation of test equipment, and information required from other sources.

All of the methods are accurate when used under proper conditions. It is advisable to mention the rates for testing. The meters should be tested at a high rate equal to or greater than the maximum rate at which they operate in service, and it seems desirable, if possible, to test them under the pressure, tem-

perature, and maximum rate conditions which exist in service. There are many cases where it is not possible to fully satisfy these conditions. For example, a meter might be used at a high pressure and it might not be possible to test it except at low pressure. The problem then becomes: What should the maximum test rate be at low pressure for a meter used at a certain maximum index rate at high pressure so that the proof may be correct in service. Numerous experiments and investigations have established the fact that if the proof of a meter is correct at a rate which produces a definite differential or drop in pressure between the inlet and outlet of a meter, the proof will be correct if the meter is used under different line pressure conditions, and the rate of flow is such that the differential or drop in pressure between the inlet and the outlet of the meter is the same as in the preceding instance.

For example, if the proof of a meter is correct at an index rate of 5,000 cubic feet an hour at 4 ounces pressure at a differential of 1.7 inches, the proof of the same meter will be correct at an index rate of 2,500 cubic feet an hour at 45 pounds pressure, since the differential produced at an index rate of 2,500 cubic feet an hour at 45 pounds pressure is the same as the differential produced by an index rate of 5,000 cubic feet an hour at 4 ounces pressure. Therefore, when meters which are used at high pressure are tested at atmospheric pressure, they should be tested at an index rate which is greater than the maximum index rate in service (when measuring gas at high pressure).

VARIOUS PRODUCTION METHODS USED IN EAST

(Continued from Page 58)

dissolved the well is bailed dry. Usually one or more applications of fresh water is sufficient to open up the well.

If the obstruction in the liner or tubing is serious, and particularly in wells of large volume which make heavy deposits of salt for considerable distances on the inside of the tubing, it is necessary to remove these deposits with a small string of cleaning-out tools which are run inside of the tubing. In some instances it is necessary to remove the tubing and replace part of the string with new tubing. If the face of the sand becomes seriously clogged it is often necessary to shoot the well to clean the face and establish new drainage lines.

The salting of wells in the eastern fields is not serious because, when monthly readings indicate that production is falling the well is immediately cleaned and bailed out. When a well suddenly declines in pressure it is shut in and pressure readings are taken at short intervals. Wells which produce small volumes of gas with high rock pressure sometimes freeze. Operators have abandoned wells that have frozen because they thought the gas had been exhausted. When a well freezes it is usually shut in for a short time in order for it to thaw out. If it does not thaw out it is necessary to run a string of cleaning-out tools or even shoot it to bring back production.

Water in Producing Wells

Water is gradually encroaching upon wells in some of the older gas pools in the eastern fields. Some sands are perfectly dry; others contain fresh water that has found its way into the sand from improperly plugged wells, and still other sands contain large quantities of salt water. Usually both the salt and fresh water is under low head, and by systematic removal serious encroachment can be prevented. Once the gas well is flooded in this territory it rarely comes back to normal production.

Water is handled in producing wells in several ways. If the gas has sufficient rock pressure the well is shut in and after it has gathered a head of gas it is "blown" and the pressure of the gas removes the water. This method, of course, is wasteful and a well must have at least 100 pounds rock pressure to successfully clear itself of water. Another method of water removal is by the installation of a pumping jack with tubes and rods by which the water is lifted in the same manner as oil is lifted from a pumping well. In pumping the water off, no gas is lost because the well continues to feed into the line at all times. Pumping is expensive and is justified only when a valuable gas well is seriously threatened by water encroachment.

Another method by which water is removed from producing gas wells is by "air lift." In this method a string of small tubing is run to the bottom of the hole, at which point an open tee is placed. In order to remove the water the small string is open to the air at the top of the well. The gas pressure in the well then forces the water up through the small tubing. At several points, depending upon the quantity of water to be removed and the volume of pressure of the gas in the well, small jets are inserted in the small tubing; thus gas is permitted to flow into the water; the volumn is lightened of water and it is removed through the small pipe. This process is somewhat similar to the air and gas lift used for producing oil in the Mid-Continent Field.

Using Compressed Air

Still another method which is used to a limited extent is that of blowing water from a well by means of compressed air. The Mosier-flowing device is perhaps one of the best examples of this type of water remover. Air is forced down into the well under pressure and the water is blown to the surface in a manner which is quite similar to blowing it out with gas, excepting that a valve at the lower end of the tubing prevents any air from getting into the gas or sand in the well. After this separation is completed, it is only necessary to open the well to the atmosphere long enough to flush the air out of the blowing string.

The usual course which operators take to free wells from water is to drill a sump 25 to 100 feet below the deepest proucing sand. The water drains into this sump and is bailed through the tubing or casing. Some large companies have movable bailing outfits which travel from well to well on a schedule and remove water. Unit pumps with electric or gasoline-driven motors are rare in the eastern fields. Their cost is prohibitive when they are used on such small wells. Occasionally, when sudden increase of waterhead threatens to drown out valuable wells, unit pumps are temporarily installed until the head is reduced to such an extent that encroachment can be stopped by bailing.

Many wells produce water with the gas. It is separated from the gas by simple tubular separators installed at the well. Drips are provided at wells which produce small quantities of water.

One of the serious phases of salt water encroachment is the deposition of crystalline salts on the face of the sand and in the tubing and casing. If the wells are systematically bailed and water is not allowed to stand in the well, less deposition takes place and the premature clogging of the well is momentarily prevented.

High-Pressure Wells

High-pressure wells are rare in the Appalachian district. Blowouts seldom occur. When high-pressure wells are expected, drilling proceeds carefully and "christmas trees" are installed for controlling the well. High-pressure valves are used in casinghead fittings in wells which do not exceed 1,500 pounds rock pressure. The large gas well in Tioga County, Pennsylvania, was brought under control by the Halliburton system.

The success of the natural gas industry in the eastern fields depends entirely upon care of small wells. A survey of the holdings of six of the largest gas-producing companies in this area reveals that approximately one out of 10 wells is capable of producing 1,000,000 or more cubic feet per day. Fully 75 per cent of these wells produce less than 100,000 cubic feet per day. Rock pressures average less than 500 pounds per square inch and at such low rock pressure water encroachment is a constant hazard. The pores of the sands are easily plugged by the paraffin content of the gas when it flows to the well under low pressure. Sufficient pressure can be had to blow out these pores and rejuvenate the wells. Under these conditions a systematic plan of care, which includes replacing the casing, bailing, shooting and systematic plan of production must be carried out by each company.

With water encroachment comes the evils of pipe corrosion, salting up of both sand face and tubing and diminution of gas flow. Most companies have established bailing schedules and keep records of the production of each well. Rock pressures are taken monthly and even at shorter periods. If the well is in the line, the rise above line pressure is observed for 1, 2, 3, 4, 5, 10, 15 and 30 minutes. In this manner some indication can be had concerning the condition of the flow. If there is a sudden decline in pressure reading it is an indication that there is some unusual stoppage in the flow of gas. Usually the well is shut in for a time and its behavior is again observed through pressure readings. If the flow has not come back to normal the well is cleaned out. If cleaning out does not remove the obstruction, the well is given a light shot.

Complete Records Kept

Complete records are kept of the behavior of each well over long periods of time so that the operator is able at a few minutes to notice to "feel the pulse" of each well and by this means is able to estimate its value and possible production. Line pressures are governed by the characteristics of the wells from which they will draw gas.

Operators in the eastern fields, particularly in the early days of the industry, have not recognized the importance of keeping detailed information concerning all phases of drilling and production of wells. Large sums of money have been lost because of incomplete data concerning old pools. Of course, there is some justification in failing to record important data because operators had only one idea in mind and that was to reach the sand and have production as soon as possible. Now that the redrilling campaign is on, thousands of dollars are being spent in prospecting old fields. In cleaning out and modernizing old wells, complete information concerning producing horizons, water conditions, packing and plugging records, casing lengths and initial production is noticeably absent.

Approximately 400,000 wells have been drilled in Pennsylvania alone and another 400,000 in the remainder of the eastern fields. Only approximately half of these wells are now producing, and records are available for a very small percentage of them.

When a well is located it should be tied in by instrumental survey to a permanent marker. Future operators can then have a definite knowledge of its presence. Note should be taken of the geological position of the top of the hole in reference to some well-known key horizon such as the Pittsburgh coal, Vanport limestone, the top of the Catskill "red beds" or the Chemung "pink rock." The recording of key position in a well log is not sufficient. The top and bottom of each sand which is encountered should be recorded and notations made of the physical characteristics of the rock. The shales which lie between the sandstone should not be disregarded. Their physical characteristics, such as hardness, color and fracture, should be noted in the log. It is well to remember always that a sand might be dry in one hole and productive in the same sand a short distance away.

Shows of Water Noted

As drilling proceeds, all shows of water, either salt or fresh, should be noted and an idea given as to the quantity and particularly the depth in the well at which these water shows are encountered should be definitely written into the well log. If in future years a leak should appear in the casing this information is indispensable. The operator not only does himself a service but people in general in locating underground supplies of fresh water because this information can be used in times of droughts to provide water supplies.

A complete record should be kept of every show of oil and gas no matter how small; the depth at which the show occurred, the approximate quantity and pressure.

If a crooked hole occurs the point at which deviation from the horizontal begins should be noted and a careful record kept of this deviation until it returns to normal. Each cave or any other drilling difficulty should not be overlooked. If a tool is lost and sidetracked the driller should notice the approximate depth at which it was passed.

Many hundreds of feet of unnecessary drilling are done each year because the depths of productive horizon were not definitely recorded in preliminary drilling. Many wells are being deepened and lack of definite records often leads to futile drilling. Exhausted gas sands are now being used for underground storage of natural and manufactured gas. In determining the value of the possibilities of a field for storage purposes complete records of old wells are essential. The position of the packers, the size and length of the casing and a complete plugging record are necessary. If water troubles should be encountered in storage fields they could be traced and remedied sooner and more efficiently if complete records are available.

Important in Evaluating Properties

Mergers of small companies into larger holding corporations have been taking place in the eastern fields. The past two years has experienced a feverish search for initial open flow and pressure records in order that the properties could be evaluated. Initial production and rock pressure observations are extremely essential in estimation of reserve and depletion of gas pools. Records should be kept of the methods of testing the wells; whether it is estimated or whether a Pitot tube or flowmeter is used. In taking initial rock pressure observations a record should be kept of the time which it took the well to build up.

The recording of initial pressures and open flows should not end the period of observation. Rock pressure observation, the rise above line pressures, the time the well was used and the line pressure against which it produced should be observed and recorded at least in monthly periods.

When a well ceases to be profitable it is plugged according to statute. Complete information should be written into the record concerning the type of plug, its length and depth, the material which was put into the well and the position of the plugs. Then if the operator should ever desire to clean out the well it could be done at less expense and in a minimum of time.

After the well has been abandoned a summation chart should be made for the well and recommendations for possibilities of drilling on near-by locations.

It is upon these minute details that rests the economic success of the natural gas industry in the eastern fields. The little details which seemed so unimportant several years ago have become recognized as the elements of success or failure of a company operating in this area.

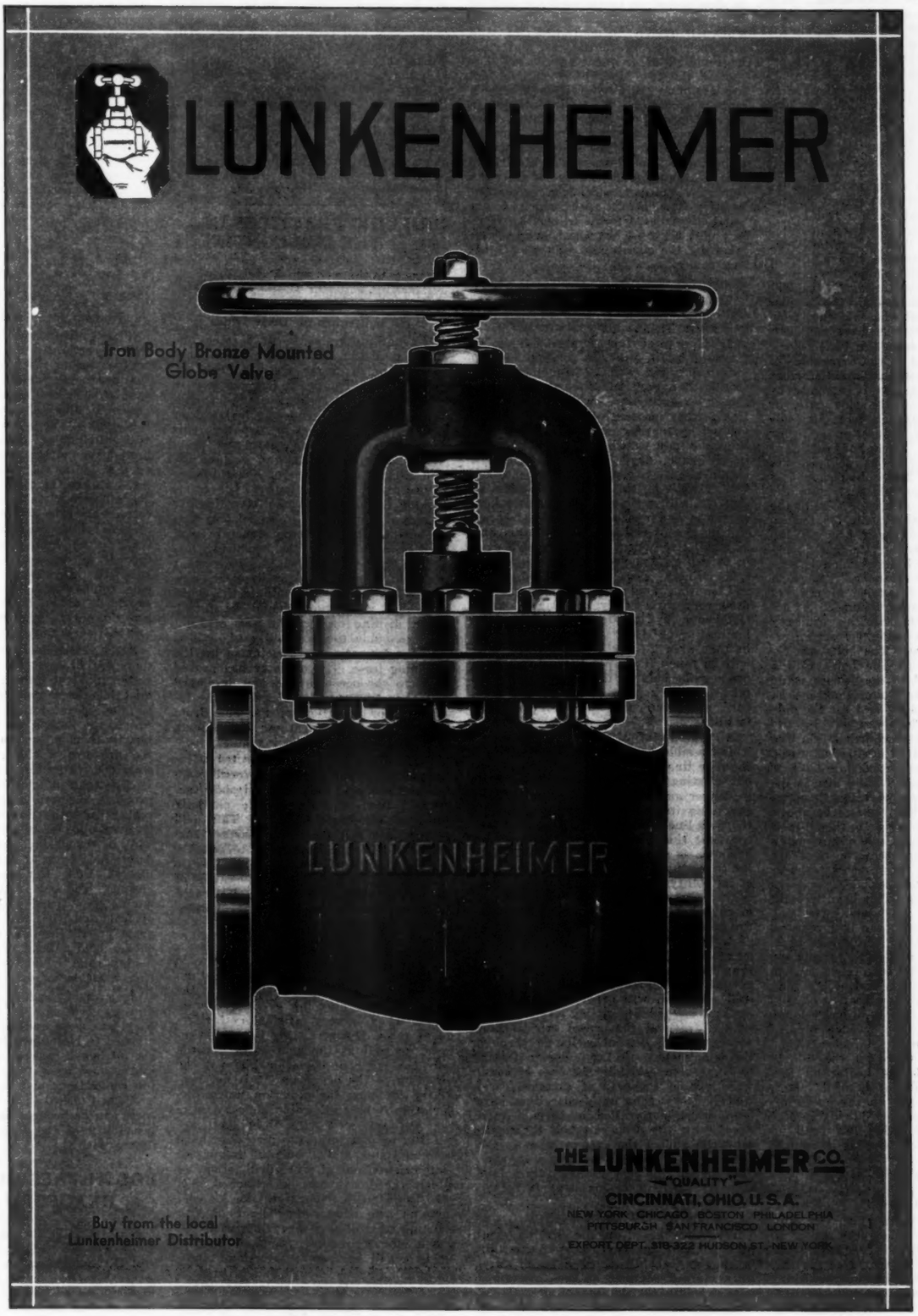
SEARCH IN NEW ZEALAND

Considerable drilling activity is reported in New Zealand, where four companies are now actively engaged in wildcatting in the vicinity of New Plymouth. A showing of oil was recently struck by one well at the 2,300-foot level and the well is being developed further.

Coal Oil, Ltd., Motorua Oilfields, Ltd., Blenheim Co. and the New Plymouth Oil Wells Co. are all active in the New Plymouth district which has thus far been the only area in New Zealand to show actual production. None of the wells thus far brought in has shown production on a commercial scale.

VOTES MUNICIPAL SYSTEM

Issuance of $150,000 in bonds for construction or purchase of a municipal gas system has been authorized in an election at Miami, Okla. The city has entered into an optional arrangement to purchase gas from a supply in Nowata County, 40 miles distant. The Consumers Gas Co. now owns and operates the natural gas system. Its franchise expires in 1934.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GAS PRODUCTION IN THE MID-CONTINENT AREA

(Continued from Page 61)

wells are rather expensive but many times the additional opening is more than worth its cost when gas is required for other purposes on the lease or temporary sales in the vicinity are available.

An ideal hook-up has a 6⅝-inch gas head with two 3-inch side openings and in under the packing and lock nut are slips for the purpose of holding part of the weight of the tubing. In case of a small high-pressure well the cross tee and its side gates could be eliminated and the gas head used in its place. However, in the case of a large well the space between the inside of the gas head and the tubing is small and should the well produce even small amounts of sand the tubing might be quickly ruined by the sand passing through such a small area at high speed. Your attention is called to the fact that a well so equipped can feed through the bleeder line alone, or through the side gate alone, or through the cross tee, or all at the same time. The well can be blown through the bleeder line alone or through the side gate from the other opening on the cross tee.

Connection from the Well

It has been found in the experience of many production men that a satisfactory connection from the well is made by swedging down from the side gate, or from a point far enough from the side gate so the bleeder connection is inside the swedge, with 2-inch of sufficient weight to safely carry the rock pressure of the well. Such 2-inch line should be laid at least 200 or 300 feet from the well, and this often along the edge of the property, to a suitable point for the installation of the hot water heater. Before entering the heater the gas is expanded into a 4-inch line which is surrounded by a water chamber. The packing off between the outside of the gas line and this water chamber is accomplished by one-half of an ordinary center ring and one follower from an ordinary pipe coupling. The bolts are ordinarily spaced to fit the holes in the follower and welded to the swedge made from one-half of the center ring to the size pipe desirable to be used for the outside of the water chamber.

Outside of the water chamber is a fire chamber. On the outlet of this hot water heater, at a convenient distance, is a meter flange in which a blind disc is inserted. A 2-inch riser of a length sufficient to allow the flow bean to be above ground level is welded onto this 4-inch pipe. On the upstream side of the meter flange a 2-inch flow bean is then attached, in horizontal position as respects the valve stem, above this nipple with a flange and welded ell. This bean is built on the principle of an angle valve and on the inlet of the flow bean is a ventura nipple. Instead of there being discs in it like a gate there is a pointed forging on the end of the flow bean stem which fits into the downstream end of the ventura nipple when the flow bean is closed.

The outlet of the flow bean looks down and in it is screwed a swedge nipple, usually from 2 inches to 4 inches. This 4-inch is extended down to the 4-inch line coming through the heater on the downstream side of the blinded meter flange. Unless the gas on the outlet of the flow bean is expanded quickly into a larger size pipe than the flow bean is made to screw onto, freezing is much more apt to occur.

Less Danger of Freezing

As I understand it, these flow beans were made primarily for oil. The oil entered on top of the cone which fits into the ventura nipple when the bean is closed. On gas wells, however, this flow bean works better if the flow of gas enters all around the point of the cone. In this manner there appears to be less chance of freezing or of ice interfering with the operation of the bean.

After the gas has passed the flow bean and entered the line again it passes at such distance as may be convenient through a drip, and from that vertically into the meter setting.

A form of cutting device is often used on high-pressure wells in place of a flow bean. It consists of a block gate with two small by-passes in such sizes as may fit the well to be handled. This kind of a cutting device is in general use and is just as dependable as the heater located immediately ahead of it, between it and the well. The gates in the by-passes should be flanged gates or screwed gates with unions in the by-pass pipes. The reason is that stops, or gates, used for cutting high pressures in these small lines, are worn out quickly, in many cases by sand and rock particles in the gas, and must be renewed at frequent intervals. The cost of the two kinds of control devices are not much different; it is largely a matter of choice. A smaller percentage of the open flow from a high-pressure well can be successfully taken through the christmas tree type of cutting device than through a flow bean. Relatively not less than 5 or 6 per cent of the open flow of a well can be dependably handled by the flow beans with which I am familiar, while per cents as small as one-half of 1 per cent have been successfully taken by the christmas tree type of cutting device.

Testing of Wells

There are three methods of testing gas wells most commonly used in the Mid-Continent Field:

1. The pitot tube method. This, as far as I know, was the original method for testing gas wells. It measures the ability of a well to deliver gas against atmospheric pressure, which is a condition seldom productive of profit. This method is not very accurate; probably if the same man tested the same well twice in the same day the results he would obtain might vary up to 5 per cent. In testing wells by this method considerable risk of drilling the well deeper is taken, considerable danger of fire is always present, danger of collapsing the casing, and of making the open hole in the well cave in is also always present.

2. Ninety per cent method. This method was developed and is now being used very successfully in Osage County, Oklahoma, by the Indian Territory Illuminating Oil Co. In most of the wells in that area 20 per cent of the volume will be taken if 90 per cent of the rock pressure be held on the well during such take, as a back pressure or working pressure. This percentage does not hold true in all areas.

3. Bureau of Mines method. When it is possible to test wells directly into the pipe line this method measures, without wasting gas, the ability of the well to deliver gas under the exact conditions governing its sale from the producer to the pipe line company. This method, for the first time in the history of the gas business, is a measure of the well's ability to earn money for the producer, and of its ability to supply the pipe line. This is exactly the condition under which money changes hands and is that measure of a well most desired. This method of testing wells makes possible more accurate knowledge of the well's condition than has ever before been possible. I do not know how many things relating to well operation will eventually be shown by this method of testing. It does not fit well without the use of critical flow provers where several wells go through the same meter. So far it does not seem to be very practical in the case of small wells nor in the case of extremely wet wells unless siphon or bleeder lines have been properly installed in them. As a usual thing the proper test of the smallest wells and of the extremely wet wells is not such an important factor anyway. The use of this method of testing wells in cases where it fits is strongly recommended.

Well Records

You have heard in the drilling symposium about the importance of carefully taken and carefully recorded and carefully studied samples of the formations penetrated in the drilling of a well. A most essential part of the work of every well is the graphic log made from these samples. Another important thing is that a steel line measurement be had and recorded at the point where the final string of casing is set. The record should show whether the casing was cemented or had a formation shutoff. If it was cemented it should show how much cement was used and what kind of cement. We now believe that it is important to have a steel line measurement on the total depth of each well. It is, of course, important to show the relative position in the producing sand of any breaks in the formation and a careful record of all the increases in gas found while drilling in the well. In general, it is impossible for the well recorded to be too complete, too correct, and too carefully made and kept. The well record is the pedigree to which many more things will be referred during the life of the well than the average man ever thinks about when the well is being drilled or the records being made. Proper well records carefully studied tell a lot about the future performance of the well, about the remedial work that will have to be done during its life, and about the ultimate recovery of gas that particular well may be reasonably expected to return to its owners.

DRILLING PRACTICES IN THE MID-CONTINENT

(Continued from Page 57)

the formation would soon have been depleted.

Straightening of Deep Holes

Recent improvements in heavier and stronger drilling equipment have made possible much faster drilling. This increase of drilling speed has resulted in unheard of records for footage in Mid-Continent fields. Frequently 500 feet or more have been drilled in 24 hours. This high speed drilling brought a new problem to the operator, that of keeping the hole straight. Assurance of straight holes is necessary for a number of reasons. Correct depths from ground elevation are of utmost importance in correlating formations so that the true structure may be determined. After the producing formation has been outlined, knowledge that the hole being drilled is vertical, aids the operator in predetermining the depth at which production should be found. When drilling on small leases, straight holes preclude the possibility of drilling into the formation at a point under the adjoining lease. The industry has proved equal to the occasion and has developed several instruments for measuring the inclination or deviation of the hole from the vertical. Each of these instruments is a marvel of scientific ingenuity.

Crooked holes can be corrected without much expense if discovered soon enough. The need for making tests often, brought forth the acid bottle partially filled with hydrofluoric acid. This acid etches glass and the etched surface furnished sufficient information to roughly calculate the deviation. The acid bottle is dangerous to the driller because of the nature of the acid used. The acid is expensive and is not readily obtainable at inaccessible points.

Level Recorded on Chart

The fluid level principle of the acid bottle has been improved upon and an instrument that records on a chart the level of a recording ink or fluid has resulted, which is very satisfactory for frequent tests. However, this latter instrument as well as the acid bottle records only the angle of deviation and not the direction of the deviation. It is not necessary to know the direction unless the deviation is past allowable limits. Among the methods used with fluid level apparatus to determine the direction, have been magnetic and gyroscopic compasses and orientation of the drill stem to which the instrument is attached. Errors in magnetic compasses due to casing and iron masses, and errors due to twisting of drill pipe have increased the use of the gyroscopic compass. An accurate small gyroscopic directional indicator has been developed and is used in a recently introduced instrument together with a camera and a highly developed type of spirit or bubble level. The camera records on separate exposures of a 50-foot film the simultaneous position of the compass, the position of the bubble in the level, and the time is shown by a watch. This film, when developed, furnishes sufficient information to calculate the inclination and direction at any depth. This instrument has the advantage over previous types by working equally well on the end of a drill pipe or a wire line.

After the position and amount of the deviation has been determined, cementing is the usual method to plug the hole and start the bit back on its proper course. The hole is filled with cement up to the point at which the deviation started and drilling is resumed. With normal precautions, the bit will resume its original vertical direction. In obstinate cases, whipstocks or flared shoes are used to keep the bit from going back into the original hole.

Time Required

The formations drilled through vary so much from field to field that no average drilling time for the entire Mid-Continent area can be stated, so the average time and depth for some of the larger fields will be given:

Refugio, Texas Field	6,500 ft.	75 days
Amarillo, Texas Field	1,750 ft.	30 days
Richland and Monroe, La. Field	2,300 ft.	35 days
Extreme Southwest Texas Field	2,000 ft.	20 days
Jackson, Mississippi Field	2,500 ft.	40 days

Finishing and Bringing in Wells

The usual practice is to equip all wells with a perforated liner or screen to prevent caving of the hole below the seat of the producing string and to hold back sand from loose formations which is dangerous if allowed to reach the inside of the casing. Wells are usually equipped with tubing or siphon line which is brought out either through a stuffing box on the side of the casing below the master gate or through the master gate, using a patent tubing head which has a retractable tube serving as the extension of the tubing normally, but capable of being lifted from the tubing proper in case it is desired to close the master gate. If this tubing head is used, the side connections are made to openings provided in the head. If the tubing is brought out through the side, the standard christmas tree is used.

After the wells have been so equipped, they are brought in by pumping clear water into the tubing until the drilling mud has been replaced and circulation of the clear water established, after which, the pumps are shut off. The tubing is then opened and in most cases the pressure of the gas is sufficient to start the water flowing from the tubing. If flow can not be started by natural pressure, the well is swabbed through the tubing until the flow starts. The tubing is then allowed to blow until the pressure in the casing has risen to a point determined by past experience, which indicates that the well is practically cleaned. The side valves on the casing, having been fitted with chokes, are then opened and the well allowed to fully clean itself through the casing. These chokes hold a back pressure on the producing sand which prevents the formation itself being drawn into the casing.

As most of the formations in the south and western part of the Mid-Continent Field are loose and soft, wells are rarely allowed to blow open because of the danger of sand, pulled out with the gas under such conditions, cutting out the top connections and causing a wild well.

Wells finished in a hard formation, or rock, can be brought in wide open as the possibility of the formation being withdrawn with the gas is remote.

BOOTH PRESIDENT OF BRADFORD PRODUCERS

BRADFORD, Pa., May 9.—A. Edward Booth was elected president of the Bradford District Pennsylvania Oil Producers' Association at the meeting of the board of directors of the association. Forest D. Dorn and Earl C. Emery were chosen vice presidents; Ralph T. Zook, secretary, and Don T. Andrus, treasurer.

The executive committee named in accordance with the new by-laws is composed of H. J. Walter, H. G. Barcroft, Forest D. Dorn, Ralph T. Zook, A. Edward Booth, Don T. Andrus, T. P. Thompson, Jr., W. J. Healey and Earl C. Emery.

ORIGIN AND REMOVAL OF PIPE LINE DUST

(Continued from Page 63)

ence considerable trouble from the internal oxidation and the later erosion resulting in the precipitation of iron oxide or rust in the gas flowing through the lines. This accounts for more than 95 per cent of our dust troubles."

Changing Direction of Flow

"Every time the direction of flow is changed either in our transmission lines or within our distributing plants, we have temporary dust trouble. When it becomes necessary to change the direction of flow we anticipate minor troubles as a natural sequence. We have assumed this internal oxidation to be due to the slight amount of oxygen which may be present in the vapor and later in the water. This is borne out further by the fact that where we have found an excess amount of internal erosion it is generally where fluids accumulate, some of which are somewhat acid."

"Where we have introduced refined gas as an enriching agent we find that some of these gases have great penetration and will loosen a considerable quantity of dust."

"On an 18-inch line 92 miles long handling 20,000,000 to 40,000,000 feet per day we remove from 30 to 60 pounds of iron oxide every two weeks."

"We have practically no knowledge of the origin of dust we have to contend with. The quantities of dirt collected seem to have no relation to the volume of gas passed but seems to vary with an increased line drop or with the velocity of flow."

"As to types of equipment we have used, these include large size pipe containing horsehair which is fairly successful if the velocity is reduced sufficiently by virtue of a large volume container being used. We have had a fair degree of success with a home-made Helix cleaner. We have used several of the cleaners employing oil as a wetting agent and feel that they are very efficient as evidenced by the absence of dirt on the measuring equipment placed after them. We have also collected a great deal of dust in dry form by means of a centrifugal type cleaner but we know that much has passed by this type to be caught later in an oil type cleaner."

"The removal of large quantities of well sand from our gas has resulted in an increase in the efficiency of our compressor plant of better than 15 per cent."

Oil Fogging of Gas

The oil fogging of natural gas used to replace manufactured gas will probably have beneficial results in delaying the drying out of deposits which would later form dust. However, the oil fogging of gas for the specific purpose of retarding dust formulation would be of rather doubtful value.

We have found it necessary to install gas cleaners ahead of compressor plants, gasoline plants and city gate stations and in one instance ahead of a single orifice meter through which we were purchasing residue gas. We have found the cleaners very satisfactory in operation and very much less expensive than the troubles caused by the dust in our lines. Because of the difficulty of accurately analyzing the exact cause and place of the origin of the dust, our policy has been to put the cleaner installation ahead of the point where we are having the most trouble. The cost of the installation per unit of capacity is least when the gas is handled at the highest pressure. Due to the fact that maximum loads may increase or decrease in the future and to the fact that the dust situation in any particular line may clear up within a few years, it has been our policy to install medium size cleaners in multiple rather than to use very large sizes. The largest cleaners we use are 48 inches in diameter while a number are 30 inches in diameter. We feel that this will be an advantage should we wish to relocate the cleaners in the future or should we wish to add to or cut down the size of any installation.

GEOLOGISTS GIVE REPORT ON TIOGA COUNTY FIELD

(Continued from Page 65)

reported by the Allegany Gas Co. to be making 2,600,000 feet a day, and to show shut-in pressure of 1,665 pounds. The increased volume probably results from the sand cleaning itself of cement when periodically the well is blown off.

Although in February two wells were out of control and expelling gas at the rate of 65,000,000 to 80,000,000 feet a day, the pressure at No. 1 Palmer is reported not to have been affected.

Log Indications

All of the wells start in the Chemung except the Clearfield County well which begins in the Pottsville beds. Most of the locations start within the upper 1,000 feet of the Chemung. The formation drilled is variously logged but sandy shale of variable lime content with a relatively small proportion of decided sand, lime and shale is shown on most drillers' logs. Gray predominates in the upper, and black or dark in the lower horizons. Red has not been logged. The best horizon marker yet determined is the Onondaga lime which immediately overlies the Oriskany sand. Where clearly differentiated in logs available to us this formation is 25 to 60 feet thick. Another horizon that may prove useful as a marker is a limestone or decided limy formation, the top of which is shown in seven logs at 840-990 feet above the Oriskany. It is locally referred to as the "1,000-foot lime." A third lime horizon appears, in five of seven logs compared, at 445-568 feet and is called locally the 500-foot lime. It is not known as yet that either of these probable markers possesses further lithologic characteristics that might increase their usefulness.

The Oriskany sand had been penetrated in two wells that failed to produce gas and is reported to be 55 to 62 feet thick. According to the Allegany Gas Co. tests made on the producing sand from the No. 1 Palmer well show its porosity to be 8 to 11 per cent.

SALES ENERGY NEEDED IN THE GAS BUSINESS

(Continued from Page 62)

which the producer plant will be operated during two or three of the cold winter months and natural gas used during the balance of the year. Often these plants can use a large volume of gas during 8 to 10 months when house heating requirements are the least, and then release this capacity during the months when it is needed to serve the house heating load. It goes without saying that industrial load of this character can be served at relatively low rates and that the return to be made on a transmission system can be increased through the development of this class of service. If sufficient off-peak load of this character can be developed at any reasonable rate it will mean that the overall load, composed of such industrial off-peak load plus a house heating load, can be served with satisfactory profit to the transmission line company and to the local distributing company. This development of off-peak load to balance the peak house heating load, is one which is perhaps of greater importance to the gas business today than almost any other single problem.

There are certain possibilities ahead of our industry which are, as yet, still in the experimental stage, but which hold great promise. I refer to commercial refrigeration and space cooling. We now have successful refrigerating units for domestic use, but nothing has been developed on a large scale for commercial refrigeration. Companies are working on the problem. It seems certain that we will have commercial units which will enable the gas industry to supply a considerable part of commercial refrigeration, and will open up fields which no utility is supplying at this time. This load will, of course, be used at maximum capacity at the time that the house heating load is off entirely; and will also make the smallest demand for gas service at the time that house heating is creating the maximum demand. This will result in a great improvement in annual load factor. Manufacturers working on this problem of commercial refrigeration should be given every encouragement and as soon as satisfactory units are available, the gas industry should get behind their sale aggressively so that this field may be developed as rapidly as possible.

Air Conditioning and Cooling

There are probably few questions which are today receiving as much attention as air conditioning and cooling. We seem to be on the verge of revolutionary developments along this line. A large number of companies are working on equipment designed for the proper filtering, washing, and humidifying of the air used for house heating during the winter months. Almost every manufacturer is designing these house heating units so that when gas-fired commercial refrigerating units are available they can be tied in with the heating equipment. Thus the same unit that circulates heated and properly humidified air in the winter months, will also circulate cooled, washed and dehumified air in the summer months. It is easy to become most enthusiastic over the prospects of this development. This cooling of buildings, offers a desirable load factor. It is true that the cooling of a given building, say a residence, will not require as much gas as is required for the heating of the same building in the winter months. It would seem, however, that the gas industry should obtain a great amount of cooling for buildings which it will be called upon to heat. Once started, this cooling should rapidly spread to department stores, small office buildings, and even to some manufacturing plants. Most of these buildings will continue to heat with coal during the winter months, but during the summer months will have a supply of fresh air, cooled and dehumidified through the means of gas service. It is easy to visualize a large amount of such cooling business where heating for the same buildings will not have to be supplied, and where such cooling load during the summer months will offset a large volume of residence heating.

The thought of this new summer load is attractive to every natural gas operator, but it must be remembered that it will come to us only as a result of hard work and large expenditures for advertising and sales efforts. There are few businesses where additional sales will come without aggressive sales activity. This is certainly true of the natural gas business.

Today's Real Problem

Today's real problem with the natural gas business, as with the manufacturing industry, is to find profitable outlets for production facilities already developed. To profitably dispose of present and future production, it will be necessary for the natural gas industry to work hard to obtain new loads, and to carry on aggressive sales activities to protect existing loads. It must be thoroughly understood that while the cost of natural gas has been going up, the price of electricity has been found coming down. The gas business must not assume that it can hold the cooking load without effort and must be prepared to actively campaign for existing and future cooking and water heating loads.

From another direction our house heating and large volume water heating load is jeopardized. Gas house heating has made serious inroads on the coal industry, and that industry is developing automatic stoking equipment and powdered fuel equipment, for use in connection with the heating of homes and the supplying of large volume water heating. Coal distributors are selling coal on a basis whereby they supply the services of a man to fire the stoking equipment each day, and remove ashes, leaving the home owner nothing to do but pay the coal bill, which includes a small additional charge per ton to cover services of firing and ash removal.

These competitors for existing loads, while formidable, need not be greatly feared, provided the gas industry is alive to the advantages of its service and tells its story through active advertising and sales departments. The outlook for the gas business has never been brighter than at the present time.

EASTERN FIELDS

(Continued from Page 69)

Godfrey L. Cabot is drilling at the 2,300-foot level in his No. 5 on the Beaver Coal Co. tract in Slab Fork district, Raleigh County, and in Trap Hill district on the Beaver Coal Co. tract this operator has a rig standing for No. 3.

Grosscup and Schultz are rigged up for No. 5 on the Black Betsey Coal Co. tract in Kanawha district, Fayette County, and have made locations for Nos. 6 and 7 on the same tract.

In drilling its No. 5,078 deeper, the Pittsburgh & West Virginia Gas Co. has reached 3,425 feet. This well is on the Philip Shuman property in Battelle district, Monongalia County. The Philadelphia Gas Co.'s No. 5,402 is drilling at the 2,000-foot level on the J. Ray Conner farm in Clay district, while the Pedlar Run Oil Co.'s test on the Lewis R. Hess farm in the same district is shut down at 2,570 feet.

SOUTHWEST PENNSYLVANIA

The Southwest Pennsylvania Field reported no completions for the week. The test of Charles Behning & Co. on the Charles Behning farm in the Brush Creek district of Jefferson Township, Butler County, has been sunk to a depth of 2,300 feet.

The Natural Gas Co. of West Virginia's No. 703 is drilling at 2,740 feet on the S. A. Post farm in south Franklin Township, Washington County, while the test of the M. Green & Co. on the John Craig farm in Donegal Township has reached the 1,500-foot level. Potts Brothers have a rig standing on the A. Woodruff farm in Chartiers Township.

The Manufacturers Light & Heat Co. is fishing for its drilling tools at 1,308 feet in its No. 3,443 on the Felix Bell farm in Wayne Township. The test of D. L. Shafer & Co. in the same township on the William Jones farm has been shut down at 850 feet. J. B. Orndoff is rigged up on the J. E. Scott farm in Center district. These operations are all in Greene County.

GERMANY'S REVENUE FROM OIL

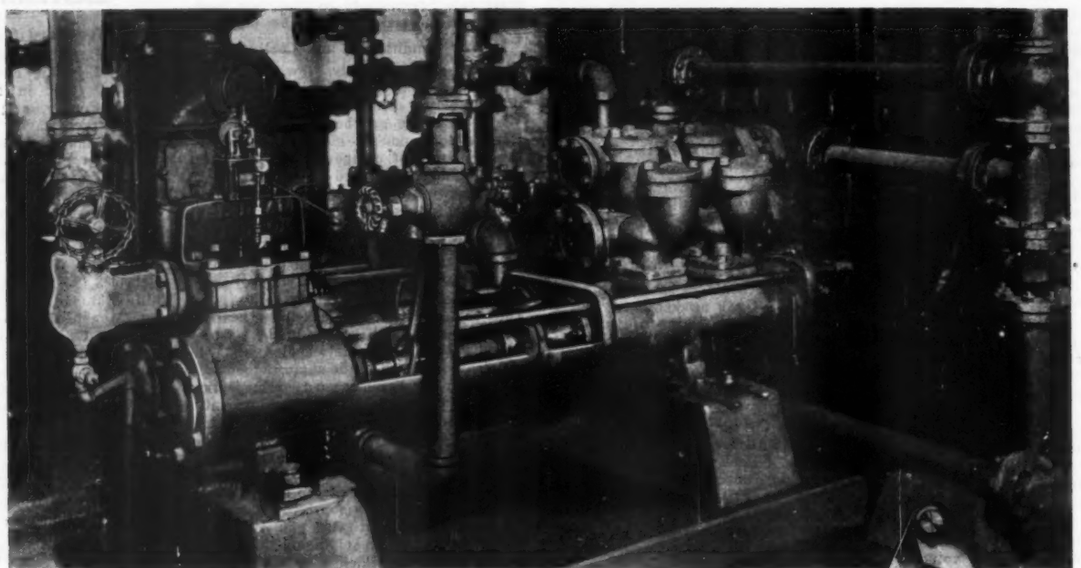
Germany, which produces only 5 per cent of her oil requirements, has set about to encourage production on a large scale and is taking her petroleum industry seriously for the first time since oil was discovered there 60 years ago, according to William S. Thomas, president of the Magdalena Syndicate, who has returned from a study of conditions in that country. His company recently acquired properties in Germany.

The duty on German oil imports is about $3.04 a barrel, Mr. Thomas said, adding that this tariff was not retaliatory but due largely to Germany's desire to protect and encourage its oil industry and to promote national defense.

"In addition," he said, "it provides an important source of revenue for meeting reparations payments to the allied countries. Through the use of about 25,000,000 bbls. of oil products annually, she is able to raise nearly $75,000,000 a year toward her obligations."

CUTTING VENEZUELAN OUTPUT

WASHINGTON, D. C., May 11.—Combined efforts of oil companies in Venezuela to restrict production will be expanded during 1931, according to advices to the commerce department. At the close of 1930, companies had cut production 581,316 bbls. under 1929 output. Orders have been given to carry out additional cuts. Total production of petroleum during 1930 in Venezuela was 136,890,784 bbls. compared with 138,472,100 bbls. in 1929. Two of the leading American companies in the Maracaibo area have begun the complete electrification of their operations.



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^ ^ ^ This Time against CREOSOTE

This outside packed pump handling creosote at a temperature of 190° F. and a pressure of 150 lbs. was a tough packing job. Many packings were tried; not one lasted more than 6 weeks.

Garlock Chevron Packing then was applied and the length of packing service increased 5 times; it jumped from 6 weeks to 7 months. But that didn't surprise us, for Chevron Packing is piling up thousands of records just as impressive under all sorts of service conditions.

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It is safe to say that you have one or more packing jobs in your plant on which you will save money by using Chevron Packing. A Garlock representative can tell you of hundreds of Chevron installations which have been entirely satisfactory where other packings failed. Call or write us today.

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GARLOCK

COMPRESSION AND THE TRANSMISSION OF GAS

(Continued from Page 25)

TABLE 1

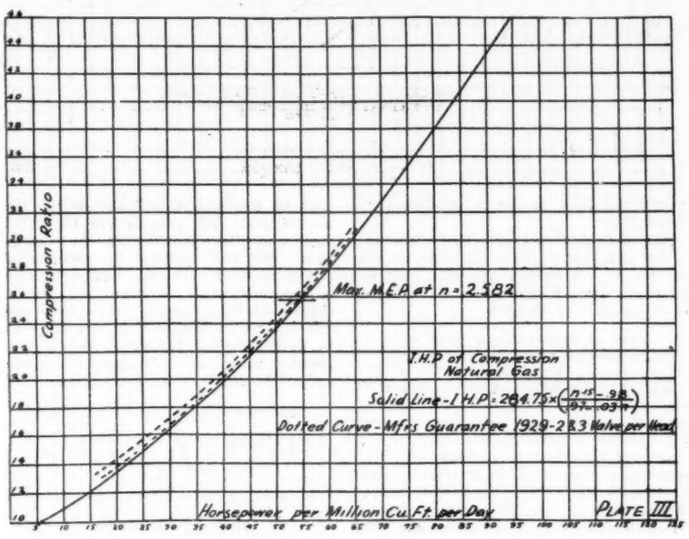
L_2 / L_1	n_2	Comparative no. of stations	Hp. per million per station	Total hp. per million	Relative to n=3
(1)	(2)	(3)	(4)	(5)	(6)
1.00	3.00	1.00	64.43	64.43	100
0.95	2.54	1.05	54.00	56.7	88.002
0.90	2.24	1.11	46.70	51.837	80.455
0.80	1.865	1.25	36.50	45.625	70.813
0.70	1.633	1.43	29.50	42.185	65.474
0.65	1.54	1.54	26.75	41.195	63.938
0.625	1.50	1.60	25.33	40.53	62.905
0.60	1.467	1.667	24.25	40.42	62.735
0.55	1.40	1.82	22.00	40.04	62.145
0.50	1.345	2.00	20.00	40.00	62.083
0.45	1.292	2.222	18.00	40.000	62.100
0.40	1.25	2.50	16.5	41.25	64.030
0.333	1.193	3.0	14.5	43.500	67.515
0.30	1.170	3.33	13.5	44.955	69.773
0.25	1.138	4.00	12.0	48.00	74.499
0.20	1.105	5.00	10.5	52.50	81.484

Column 3 is the reciprocal of column 1. Column 2 is computed from equation 8 for the corresponding values of $\frac{L_2}{L_1}$ shown in Column 1. Column 4 is taken from Plate 3 for the corresponding values of Column 2. Column 5 is the product of Columns 3 and 4 and represents the i.h.p. per million per station multiplied by the number of stations, or is the total required horsepower per million cubic feet per day. Column 6 is derived by dividing Column 5 by 64.43 and represents the total required horsepower per million feet per day compared to that which would be required if a compression ratio of 3.0 were adopted.

On Plate 4 the comparative total horsepower requirements and comparative lengths between stations are plotted against compression ratio. The curve of comparative horsepower requirements shows that the minimum total horsepower will be required with a compression ratio of about 1.35, at which compression ratio (see Plate 3) the horsepower per million per day is about 20 i.h.p. per station. The curve of comparative lengths between stations shows that to achieve this compression ratio and maintain the same line capacity the stations would be just half as far apart as for a compression ratio of 3, or there would be twice as many stations. However, even with twice as many stations, we would require only 60 per cent as much total horsepower.

Now the capacity of the line for given maximum pressure, pressure ratio and diameter varies as $\frac{1}{\sqrt{L}}$ or $Q = C_1 \frac{1}{\sqrt{L}}$

The relative number of stations required varies as $\frac{1}{L}$ or $N = \frac{C_2}{L}$.

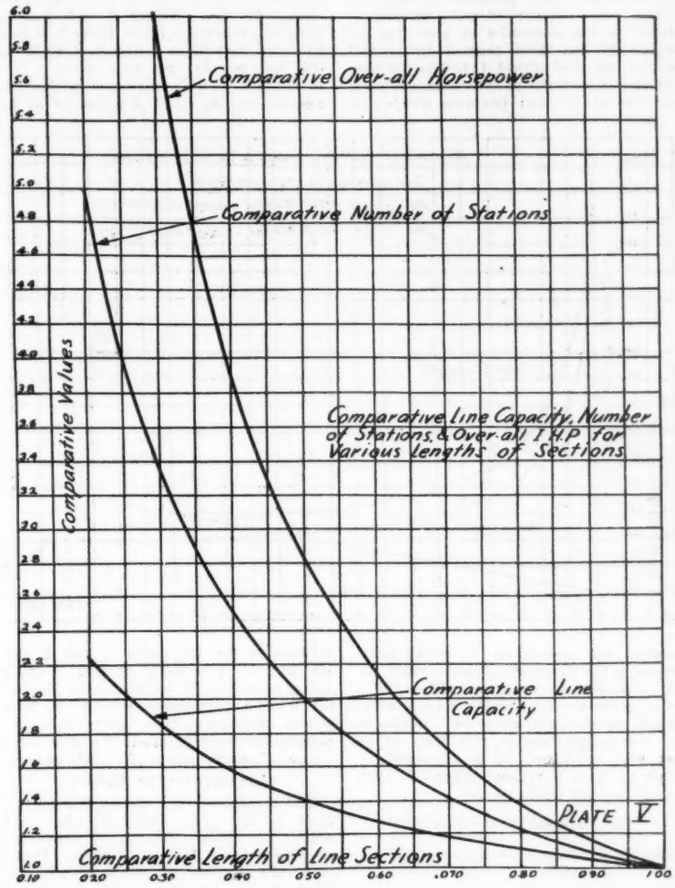

Compression Ratio
Max. M.E.P. at n = 2.582
I.H.P. of Compression Natural Gas
Solid Line - I.H.P. = 264.75 × (n^1.15 − 98) / (.03 n^1.15)
Dotted Curve - Mfrs Guarantee 1929-283 Valve per Head
Horsepower per Million Cu. Ft. per Day
PLATE III

The total horsepower per million of capacity then equals $\frac{C_2 \times 20}{L}$, or the total horsepower per million increases inversely as the length of sections. The overall horsepower being then the product of total horsepower per million and quantity in millions is $\frac{C_2 \times 20}{L} \times \frac{C_1}{\sqrt{L}}$ or is proportional to $\frac{1}{L^{1.5}}$. For lines of various relative lengths we would then have the following horsepower requirements for a constant pressure ratio:

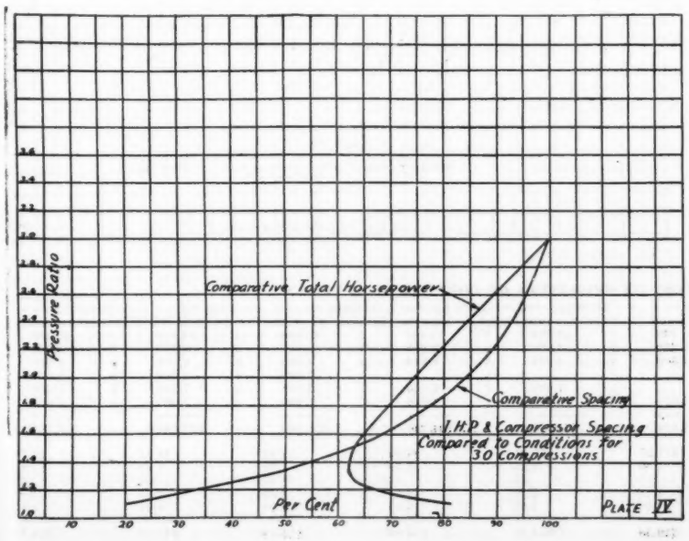
TABLE 2

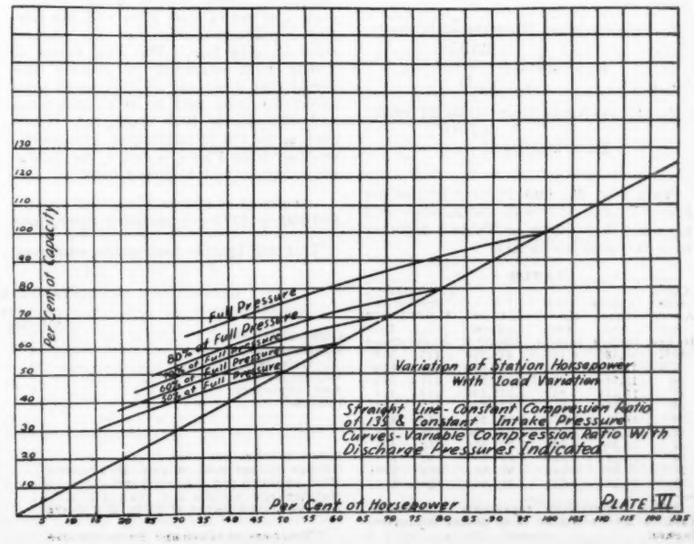
Comparative length of section	Comparative No. of stations and total hp. per mil.	Comparative overall hp.	Comparative line capacity
1.00	1.000	1.000	1.000
0.90	1.111	1.170	1.052
0.73	1.333	1.538	1.154
0.60	1.667	2.150	1.290
0.50	2.000	2.825	1.414
0.40	2.500	3.950	1.580
0.30	3.333	6.061	1.820
0.20	5.000	11.200	2.240

The data of Table 2 are plotted on Plate 5. From Plate 5 it may be noted that halving the distance between stations increases line capacity by 41.4 per cent, doubles the number of stations, and increases the total horsepower 82.8 per cent, or the horsepower requirements increase at just twice the rate at which the capacity increases when capacity is increased in this manner.


Comparative Over-all Horsepower
Comparative Number of Stations
Comparative Values
Comparative Line Capacity, Number of Stations, & Over-all I.H.P. for Various Lengths of Sections
Comparative Line Capacity
PLATE V
Comparative Length of Line Sections

Variations in rate of flow may be accomplished by either maintaining a constant discharge pressure and varying the intake pressure (which means varying the ratio of compression) or by holding a constant compression ratio and varying the discharge pressure, or by combination of the two. If the compression ratio be held constant at, say, 1.35 compressions, then the horsepower per million being a constant value of 20 for this compression ratio, the total horsepower is directly proportional to quantity. This is illustrated by the diagonal straight line on Plate 6. If, however,




Per Cent of Capacity
Full Pressure
80% of Full Pressure
70% of Full Pressure
60% of Full Pressure
50% of Full Pressure
Variation of Station Horsepower With Load Variation
Straight Line - Constant Compression Ratio of 1.35 & Constant Intake Pressure
Curves - Variable Compression Ratio With Discharge Pressures Indicated
Per Cent of Horsepower
PLATE VI

instead of maintaining constant pressure ratio, we maintain full discharge pressure P_1 and vary the intake pressure the horsepower requirements are as shown on full pressure curve, Plate 6. Similarly, the horsepower requirements, if P_1 be reduced to 80 per cent, 70 per cent, 60 per cent, or 50 per cent of full value, are indicated. The economical method shown by this sheet is to maintain full line pressure and let load variations be reflected in the variation of inlet pressures. Other factors, however, often are of more importance than the saving in horsepower hours developed.

Most Economical Discharge Pressure

The question of what is the most economical discharge pressure at which a compressor station should operate is fixed by the economics of pipe line design. It has been treated by several writers on this subject (1). The net conclusion is that the most economical pressure to use is that pressure which will produce the maximum allowable fiber stress in the thinnest allowable wall for the pipe size in question. There is a great diversity of opinion as to what should be the minimum wall thickness and any suggestions on this line will be met with criticism. It is suggested as being at least a rational approach that minimum wall thickness be

$$T_m = 0.0090375\ D + 0.08733$$

where T_m = minimum wall thickness in inches

D_o = outside diameter in inches

Under this assumption the pressure P (the safe pressure for a wall of minimum thickness) in pounds gauge which will stress the walls to the allowable limits are:

For 16,000-pound fiber stress in walls

$$P_m = 289.2 + \frac{2{,}794.6}{D}$$

For 13,000-pound fiber stress in walls

$$P_m = 235.0 + \frac{2{,}270.6}{D}$$

Values of T_m and P_m are plotted on Plate 7, and the wall thicknesses and pressures are shown in Table 3 together with the pipe coefficient.

TABLE 3

Outside diameter inches	Inside diameter inches	Wall thickness inches	Flow coefficient* K	Gauge pressures 13,000 lb. stress	Gauge pressures 16,000 lb. stress
10¾	10.330	0.185	446,900	445	550
12¾	12.364	0.203	712,500	410	510
14	13.570	0.215	913,300	397	489
16	15.536	0.232	1,310,100	377	464
18	17.500	0.250	1,799,700	361	444
20	19.462	0.269	2,389,300	349	429
22	21.426	0.287	3,087,700	338	416
24	23.390	0.305	3,901,400	330	406
26	25.354	0.323	4,837,300	322	397
28	27.318	0.341	5,902,300	316	389
30	29.282	0.359	7,103,000	311	382

*Flow coefficient represents the value ($871 \times D^{2.567}$) where D = inside diameter, inches.

$$\text{The capacity} = Q = KP \times \sqrt{1 - \frac{1}{n^2}}$$

where $K = 871 \times D^{2.567}$. It has been shown that for any given pipe size or pressure the economical value of n is about 1.35, and for this value of n the quantity $1 - \frac{1}{n^2} = 0.673$. If, therefore, we multiply the pipe coefficient by the absolute pressure above corresponding to the wall thickness and this by 0.673 we would have a quantity which divided by square root of length would give line capacity at minimum horsepower per station and minimum weight of steel for each line size. Plates 8 and 9 have been so prepared. From Plate 9 it may be noted that for a capacity of 100,000,000 feet per day we may select a line of 18-inch outside diameter with compressor spacing of 30.5 miles, or as alternates, a line 20 inches outside diameter with a compressor spacing of 50.5 miles, or a line 22 inches outside diameter with a compressor spacing of 80.5 miles. Similarly, from Plate 8 a determination may be made for pipe having an allowable stress of 13,000 pounds.

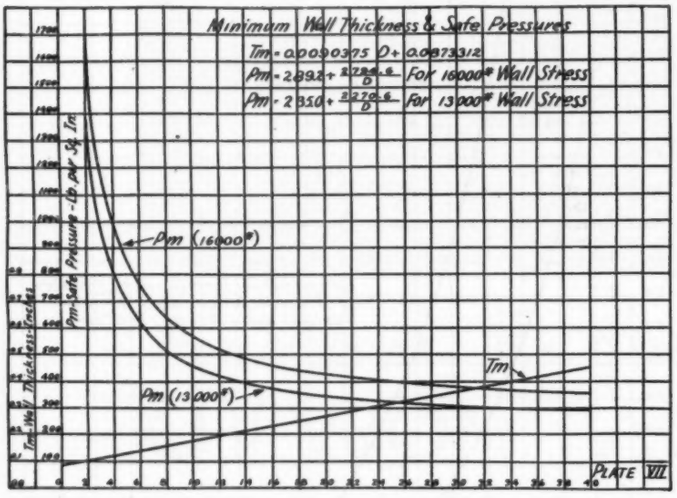
Horsepower Per Station

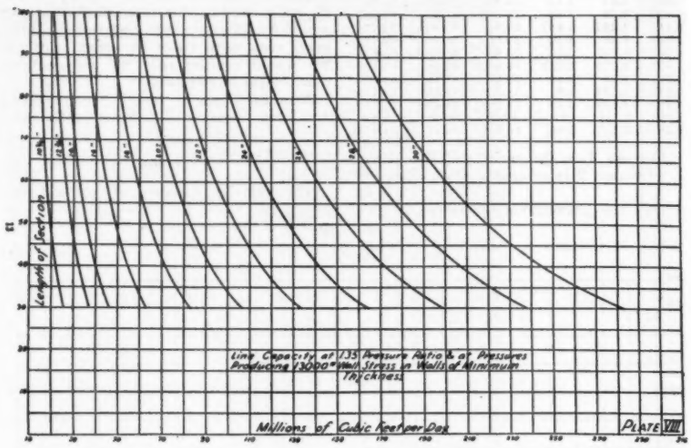
The horsepower per station will be the same in all cases, about 20 i.h.p. per million, or 2,000 i.h.p., since the compression ratio is 1.35 in all cases. However, the number of stations will be fixed by the compressor spacing so selected.

Six estimates of investment and of corresponding operating expenses will then be necessary to determine the most economical layout. The result will be dependent upon station costs, relative costs per ton of steel pipe, and the relative construction costs of the various sizes of pipe line. The last varies so widely with character of country traversed that a general solution based upon assumed terrain may be quite misleading and will not be here attempted. However, as an aid to solution of any specific problem from Plates 8 and 9, the following equation will be found helpful:

Cost of compressor stations = \$40,000 + \$115 per installed horsepower

This will include real estate, employes' residences, railway siding, water supply from artesian wells, etc., for a well-constructed main line station designed for permanency, with a reasonable allowance for engineering and overhead charges, but no interest during construction nor costs of financing. If hauling of equipment is required, additional costs will be incurred. Many stations have recently been built using cheaper construction at far below this cost. Whether the difference is justified is a matter for later operating experience to determine.


Minimum Wall Thickness & Safe Pressures
Tm = 0.0090375 D + 0.08733/12
Pm = 289.2 + 2794.6/D For 16000# Wall Stress
Pm = 235.0 + 2270.6/D For 13000# Wall Stress
Pm (16000#)
Pm (13000#)
Tm
Pm-Safe Pressure-Lb. per Sq. In.
Tm-Wall Thickness-Inches
PLATE VII


Length of Section
Line Capacity at 1.35 Pressure Ratio & at Pressures Producing 13000# Wall Stress in Walls of Minimum Thickness
Millions of Cubic Feet per Day
PLATE VIII

Cost of Operating Compressor Stations

An approximation of the cost of operation of compressor stations may be made from the following equation, based upon the data of Table 5.

Cost of operation per year = \$10,000 plus \$7.75 per horsepower

This includes labor, supplies, fuel at 7 cents per 1,000 cubic feet (for 60 per cent of load factor) and maintenance, but excludes taxes and fixed charges.

One of the common problems met in connection with compressor stations has to do with the location of field stations, should they be located as close to the field as possible or at some distance away from the field. This question may be analyzed by an example: Assume a 20"x⅜" line, 65 miles long, with 400 pounds inlet pressure and 150 pounds outlet pressure. The capacity is

$$2{,}318{,}210 \times \frac{381}{\sqrt{65}} = 109{,}500 \text{ M.c.f. per day}$$

Due to declining rock pressures, it is no longer possible to maintain 400 pounds inlet pressure without compression in the field or nearby. We will assume that for the first year of such compression an inlet pressure of 300 pounds may be maintained, 250 pounds for the second year, 200 pounds for the third year and 150 pounds for the fourth year. We will compare the amount of power required with the station located in the field with the power required if the station be located 10 miles from the field on the basis that the capacity is to be maintained at 109,500,000 cubic feet per day when the outlet pressure at the end of the line is 150 pounds gauge:

Square of (150 + 14.4) = 27,027

$$\left(\frac{109{,}500{,}000}{2{,}318{,}210}\right)^2 \times 55 = 122{,}500$$

Square of (373.0 + 14.4) = 149,527

Discharge Pressure

The discharge pressure from a station 10 miles from the field is 373 pounds gauge as compared to 400 pounds for a station in the field. The inlet pressures

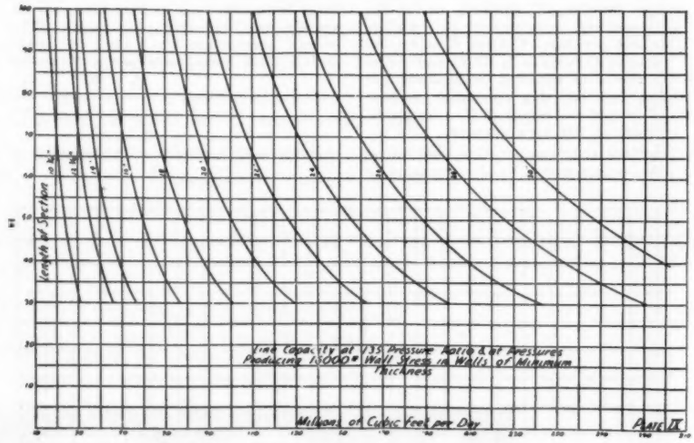

Length of Section
Line Capacity at 1.35 Pressure Ratio & at Pressures Producing 13000# Wall Stress in Walls of Minimum Thickness
Millions of Cubic Feet per Day
PLATE IX

TABLE 5—COST OF OPERATION OF COMPRESSOR STATIONS

Size of station—	1,000 hp. Number	1,000 hp. Amount	2,000 hp. Number	2,000 hp. Amount	3,000 hp. Number	3,000 hp. Amount	6,000 hp. Number	6,000 hp. Amount	8,000 hp. Number	8,000 hp. Amount	10,000 hp. Number	10,000 hp. Amount
Chief engineers	1	$2,400	1	$3,000	1	$3,600	1	$3,600	1	$3,600	1	$3,600
Engineers	2	3,600	2	3,600	2	3,600	3	5,100	3	5,100	3	5,100
Helpers	3	4,500	3	4,500	3	4,500	3	4,500	6	9,000	6	9,000
Machinists	0	....	0	....	0	....	1	2,000	1	2,000	1	2,000
Aux. engineers	0	....	1	2,400	3	5,400	3	5,400	3	7,200	3	7,200
Laborers	1	1,000	1	1,000	1	1,000	2	2,000	2	2,000	3	3,000
		$11,500		$14,500		$18,100		$26,600		$32,900		$33,900
Labor per hp. per year		$11.50		$7.25		$6.03		$4.43		$4.11		$3.77
Oil per hp. per year, 6 gals. @ 30 cents		1.80		1.80		1.80		1.80		1.80		1.80
Misc. supplies per hp. per year		.35		.35		.35		.35		.35		.35
Maintenance per hp. per year, 2%		3.10		2.70		2.57		2.43		2.40		2.38
Fuel 60% load factor @ 11 ft. @ 7 cents		4.05		4.05		4.05		4.05		4.05		4.05
Total exc. of taxes and fixed charges		$20.80		$16.15		$14.80		$13.08		$12.71		$12.35

to a station 10 miles from the field are computed as follows:

Field pressure gauge	150	200	250	300
Square of absolute	27,027	49,967	69,907	98,847
$\left(\frac{109,500,000}{2,318,210}\right)^{\frac{1}{4}} \times 10$	22,300	22,300	22,300	22,300
Square of station inlet pressure ..	4,727	27,667	47,607	76,547
Station inlet pressure, absolute ..	63.8	166.4	218.4	276.8
Station inlet pressure gauge	54.4	152.0	204.0	262.4

The ratios of compression, horsepower per million and total horsepower are shown in Table 6:

TABLE 6

Field pressure gauge	Ratio of compression: Station at field	Ratio of compression: Station 10 miles from field	Hp. per million: Station at field	Hp. per million: Station 10 miles from field	Total horsepower: Station at field	Total horsepower: Station 10 miles from field
300	1.317	1.390	19.0	21.5	2,080	2,355
250	1.566	1.758	27.8	33.5	3,045	3,670
200	1.931	2.310	38.5	43.5	4,220	4,770
150	2.521	5.59	53.75	111.0	5,885	12,160

With field boosters delivering at 200 pounds from an inlet pressure of 150 pounds the line station 10 miles away would require 4,770 horsepower, and the field booster station 150 pounds to 200 pounds, 19 horsepower per million, or 2,080 horsepower, making a total of 6,850 horsepower to accomplish what could be done with 5,885 horsepower located at the field. The advantage of pushing the gas rather than trying to pull it is well illustrated by this example.

Most calculations herein are by slide rule and are not highly accurate. The purpose being only to determine tendencies, it is felt that these are of no importance.

It will probably be asked why transmission system designs vary so widely from the principles set forth in this paper. The answer is that the necessity of designing an installation which can earn its charges during the early years of operation usually makes necessary a design which in later years is far from the most economical installation.

SURFACE CONDITIONS IMPORTANT IN EAST

(Continued from Page 60)

kany sand, Medina sandstone, Trenton sand and Potsdam sandstone.

Pennsylvania and West Virginia — Uniontown sandstone, Mapletown coal, Pittsburgh coal, Murphy sand, Big Dunkard, First Gas sand, First Salt sand, Second Salt sand, Third Salt sand, Maxton sand, Big lime, Keener, Big Injun, Squaw, Murrysville (Berea), Grantz, Fifty foot, Thirty foot, Snee, Gordon stray, Gordon, Fourth, Fifth, Bayard group, First Warren, Second Warren, Speechley stray, Speechley, Tiona, Balltown, Sheffield, First Bradford, Second Bradford, Third Bradford, Benson, Kane and Elk group.

Ohio—Mitchell, First Cow Run, Second Cow Run, Macksburg, Big lime, Keener, Big Injun, Squaw, Berea, Corniferous and Niagara limestone, Clinton sand and Trenton limestone.

Kentucky — First Salt, Second Salt, Maxton sand, Big lime, Big Injun, Berea, Corniferous lime, Clinton sand and the Trenton limestone.

Tennessee — Fort Payne formation in the Mississippian and Sevier shales.

Alabama—Pottsville formation.

The Big Injun sand of the Mississippian is the outstanding single sand in the Appalachian Field. It has a thickness varying from 50 to 400 feet. In many places it has two or more pays and is the most prolific producer in the Appalachian Field.

Average Depths

Average depths drilled in the eastern division are:

	Feet
New York	2,000
Pennsylvania	3,000
West Virginia	2,500
Kentucky	1,800
Ohio	2,500

The percussion method (cable tool drill) has been found most suitable for drilling in the Eastern Field and is used exclusively. This method employs a string of tools consisting of a bit, stem, jars and rope socket. The bit is attached to the lower part of the stem by means of a tapered screw joint. Joints are made and broken by means of a jack acting against wrenches operating on a circular track.

The jars are attached to the upper part of the stem; and the rope socket to the upper end of the jars, by tapered screw joints.

Drilling bits are from 4 to 8 feet long, solid forged steel, somewhat smaller in diameter than the size of the hole to be drilled, and have a water course along each side. The lower end of the bit is dressed out to the diameter of the hole to be drilled and heat tempered in the field.

In dressing bits of large diameter, a dressing ram is sometimes used. A dressing ram is a round solid steel shaft flat at one end and tapering into a handle at the other, weighing from 250 to 500 pounds. The ram is suspended from the derrick crane or roof and is used to drive out the end of the bit, thus eliminating a lot of sledge work. This method is more efficient in carrying steel stock into corners. The short bevel is used to prevent sticking and crooked holes.

Stems used are round solid steel shafts 24 to 48 feet in length, varying in diameter with size of hole being drilled.

Jars of the link coupled type with an average 4½-inch stroke are the standard type used for drilling. The length of stroke may vary from 2½ to 70 inches for special purposes, those with 36 and 48-inch strokes are recognized standard fishing jars. In the Bradford area some drilling contractors are no longer using jars.

The weight of the stem and bit is sufficient to give a blow which will crush material being drilled through. The snap exerted when the bit just strikes the bottom at the end of the downward stroke is the most effective blow. Hence in hard formations it is necessary to keep the tools fairly tight.

Cables, Power and Special Equipment

Rope sockets vary for attaching manila rope or wire line to the tools. Manila cable 2¼ inches in diameter by 250 to 300 feet long is attached to the bottom of the wire cable to give flexibility. Crucible steel cable seven-eighths inch (6x7 and 6x19) is used for drilling holes 3,000 to 4,000-foot depths. For drilling greater depths, mild plow steel cable is used to avoid cutting and denting.

The most commonly used power unit is the boiler and steam engine. Boilers use coal, oil, gas or wood as fuel, according to which is most economical. The power is transmitted to the band wheel by means of a friction belt.

Other power units used include: Gas engines—4 cycle 125-horsepower; electric motors; and recent development has been started toward adapting Diesel motors to drilling needs.

Standard rigs are becoming superseded by drilling machines of the anchored mast type. During recent developments in Tioga County, California, rigs with calf wheels have been used.

Shear poles are used to relieve strain from mast or derrick when casing is run or pulled at depths greater than 3,500 feet.

Wells are started by "spudding." This is accomplished by attaching a "jerk" line to the wrist pin of the main driving shaft crank, the other end of the line being connected with a spudding shoe which works freely on manila cable. The horizontal motion of the jerk line is thus imparted to the cable which goes over the crown pulley and raises and lowers the tools. As the spudding proceeds, by gradually unreeling the cable from the bull wheel shaft by means of a brake, the tools are lowered into the hole. After spudding in for some distance, so that the walking beam can be used satisfactorily, the jerk line is removed and the cable is attached to the temper screw by friction clamps. The temper screw is fastened to one end of the walking beam and can be legthened by unscrewing as drilling progresses.

Drilling Equipment

The temper screw consists of (1) a frame with a cross tee for attaching to the walking beam, (2) a main screw 5 to 6 feet long, (3) let out handle, (4) swivel head.

Drilling clamps are of two types, for manila cable, and steel wire cable.

Manila drilling clamps consist of (1) a "C" or body; (2) two shoes with rings or links for attaching to (3) the swivel head, and (4) a tee screw for pressing the clamps together.

The wire line clamp operates similar in principle to the manila clamp and consists of (1) two jars with links for attaching to (2) swivel head, (3) liners fit into grooves in the jaws which are clamped together by means of (4) a tightening saddle with (5) a screw and tightening handle to press the clamps together.

The walking beam of steel or wood construction rests on a bearing fulcrum on the samson post. The temper screw is attached to the end of the walking beam over the hole and the pitman is attached to the end over the band wheel crank arm. When the pitman is attached to the band wheel crank arm, the rotation of the band wheel causes an up and down motion of the pitman, alternately raising and lowering the temper screw and the tools attached. The percussion causes the cutting or crumbling of the material drilled through into fine bits and is mixed with water and reduced to a mud which in turn is removed by a bailer. A bailer is a hollow tube 30 to 40 feet long, slightly smaller in diameter than the hole, and is fitted with a plug valve at the lower end which is raised and opened when the bailer rests on the bottom and closes when the bailer is raised.

Jar type bailers are used where there is any danger of the bailer sticking. This type bailer is fitted with a jarring link top to which is attached a weight that extends down inside the bailer.

Casing Methods

The method of casing wells varies as to each locality. The size of the hole to be started depends upon the number of coal seams to be protected, water conditions and the ultimate depth to be reached. Usually a 13-inch hole is drilled to start a well. Strings of 10, 8¼ and 6⅝-inch casing are run at various depths, and in many cases the wells are tubed with either 2, 3 or 4-inch tubing.

Whenever possible where high pressure is expected the correct method of casing is to reduce the hole a short distance above the producing sand, set the casing with B. H. Packer or cement before drilling into the producing sand. The first string should be long enough to permit safe drilling and the second string should be sufficiently strong to withstand the rock pressure anticipated in the well.

Two sets of link elevators are generally used when casing a well. One elevator rests on a block on the derrick floor to support the string of casing in the hole. The elevator attached to the casing block hook is used to raise the joint to be screwed in. Screwing is accomplished by a casing pole, manila rope and pipe grip. Following tightening, the entire string is raised and the lower elevator removed, the string is then lowered until the upper elevator rests on the block.

Spider and Slip Elevator Used

Deep wells—that is wells more than 3,000 feet deep—are cased with the use of a spider and the slip elevator. The spider rests on the derrick floor or in the cellar and supports the entire string of casing by means of four wedge-shaped slips. The slips are raised or lowered to operate equally by means of an extension lever.

The operation of the slip elevator for holding or releasing the pipe is similar to that of the spider. But instead of using a lever, a device has been perfected which by reversing a small trip automatically causes the slips to engage or release.

The joint of casing to be added is raised from the derrick floor by attaching it to a manila rope (approximately 15 feet long) fastened to the casing block. After being raised vertically the joint is screwed into the collar of the joint in the hole. To screw in the joint several coils of 1-inch manila line are wrapped around the joint with one end running to the calf wheel shaft. The other is held to act as a snub on the pipe line.

Final tightening is accomplished by use of tongs operated with a jerk line attached to wrist pin of band wheel crank.

When tightening is completed the elevator is lowered over the joint and the entire string is raised to release the spider.

How Cavings and Water are Handled

Cavings that appear and impede drilling are generally overcome by pouring 30 to 40 feet of cement in the hole, permitting it to set and then drilling through the cement which leaves a solid wall that keeps out the cavings. Standard portland cements are used or when speed is essential a quick setting cement may be used.

Crooked holes generally result from loose drilling, and may be remedied by keeping the tools tighter while drilling. Dipping formations from 0° to 20° from the horizontal may cause a drift from the vertical. Crooked holes may be straightened by pouring cement, letting it set, and drilling through.

Fifteen to sixty days is the average time required to complete a well in the eastern area, depending on depth where production is found.

In cementing casing, recent practice has made use of the Halliburton mixing method and the two-plug principle. The bottom plug is placed in the casing, the cement is mixed and pumped into the casing on top of the bottom plug, then the top plug is placed in the casing. Water is then pumped into the casing on top of the top plug, thus forcing both plugs, with the cement in between them, down the casing. The progress of the top plug is indicated by means of a measuring line. When the plug has reached the point where the desired top of the cement is to be, the pump is stopped, and the well is allowed to remain shut in long enough for the cement to harden sufficiently to be drilled through.

Shutting in and Finishing

Following the completion of casing and tubing the well, a stuffing box casinghead is screwed on the casing—a gland follower to conform to the size of the tubing rests against a rubber gasket so as to prevent the gas produced through the casing from leaking past the tubing. This gland is tightened to prevent leaking by means of bolts connected to a lower follower.

Anchor clamps equal to the size of tubing are placed above a tee or top gate. Rods attached to the anchor clamp are hooked into the 10-inch or into another anchor clamp fastened below the collar of the largest casing.

For high-pressure gas, the last string of casing is left extended far enough above the outside casing to enable putting on a control or master gate. When the well is drilled in, a "christmas tree" is attached. The "christmas tree" consists of a swedge nipple with four openings which is fastened to the top of the tubing. The purpose of the "christmas tree" is to permit a greater flow of volume with a reduction in pressure by utilizing a number of openings.

The most recent development in the Eastern Field is that in Tioga County, Pennsylvania. Four producing wells have been drilled and four dry holes have been completed, and several wells are now drilling. One of the largest wells ever completed east of the Mississippi River has been drilled in this field. It was drilled by the Penn United Gas Co., on the Benjamin Meeker farm. The production is from the Oriskany sand and was obtained at a depth of 4,197 feet. The estimated open flow was 80,000,000 to 100,000,000 feet of gas per day. The well blew wild for 16 days, and three hours after shutting in had a pressure of 1,435 pounds.

HOW NATURAL GAS GETS TO YOUR HOME

(Continued from Page 56)

1¼-inch size are welded to the gas lines for an additional charge of about $1.25 each. The additional material needed to deliver the gas to the consumer's property line from the main gas line will cost from $4 to $4.50 depending upon the distance from property line to gas line, as outlined above.

If paving has to be broken there is an additional charge of from 80 cents to $1.50 per lineal foot of pipe line the width of the ditch. This includes the cost of breaking and replacing the concrete. The contractor furnishes the cement.

These costs will vary for different jobs depending upon the type of work to be done and the local conditions but in a general way the gas companies use an empirical figure of $100 per meter for such installations and for the southern sections of this country it has proven fairly accurate.

This gives some idea of the details and costs that must be covered by a gas company in distributing gas to the ultimate consumer and indicates that the investment in such systems will mount into large sums in many instances and upon such investments the company has a right to expect a fair return on its money.

EAST CENTRAL TEXAS

(Continued from Page 51)

3,608 feet. Markham and Dunning's No. 4 J. N. Peterson, oil sand 3,604-08 and 3,658 feet, initial production 153 bbls. per hour through 1-inch tubing choke, total depth 3,662 feet. McIntyre and others' No. 1 M. L. Thompson, sand 3,717-51 feet, initial production 113 bbls. in 30 minutes on one-half-inch tubing choke, total depth 3,752 feet. Moss and Urschell's No. 2 Mayfield-Alford, sand 3,596-3,600 feet, initial production 50 bbls. first three hours through tubing, total depth 3,750 feet.

Pioneer Oil Co.'s No. 3 Thrash, location abandoned. Same company's No. 4 Thrash, abandoned location.

Ramsey Petroleum Corp.'s No. 1 Kangerga, sand 3,797-3,824 feet, dry and abandoned, total depth 3,883 feet. George Ray and others' No. 1 M. L. Thompson, sand 3,676-88 feet, initial production 350 bbls. per hour through sixty-eight-sixty-fourths-inch choke, total depth 3,742 feet. Roeser and Pendleton's No. 1 Glenn Pool, sand 3,680-3,706-32-37 feet, initial production 140 bbls. per hour through tubing, total depth 3,740 feet. Sinclair Oil & Gas Co.'s No. 1 W. D. Kinney, oil sand 3,667-69 feet, initial production 125 bbls. first 30 minutes pinched through tubing, total depth 3,675 feet. Sun Oil Co.'s No. 2 Selman, sand 3,666-3,704-06-08 feet, initial production estimated 200 bbls. per hour pinched through tubing, total depth 3,708 feet.

Tidal Oil Co.'s No. 2 Nat Bean, top sand 3,610 feet, initial production 65 bbls. first 30 minutes, total depth 3,648 feet. Same company's No. 2 M. R. Terrell, top sand 3,592 feet, initial production 90 bbls. per hour through fifty-sixty-fourths-inch tubing choke, total depth 3,601 feet. Tulsa Oil Co.'s No. 1 Kangerga, sand 3,631-66 feet, initial production 225 bbls. per hour pinched through tubing on a three-sixty-fourths-inch choke, total depth 3,666 feet. Turman's No. 2 Young, sand 3,668-3,700 feet, initial production turned into tanks and shut in, no gauge, total depth 3,709 feet.

G. H. Vaughn's No. 2 Young, sand 3,674-89 feet, initial production 840 bbls. first eight hours through tubing, total depth 3,750 feet. Ward Oil Co.'s No. 1 Finney, oil sand 3,687-3,719 feet, initial production 1,615 bbls. first 12½ hours through tubing, total depth 3,720 feet. Weaver-Crim's No. 1 B. F. Laird, top sand 3,590 feet, initial production 128 bbls. in 15 minutes open through tubing, total depth 3,625 feet. Westheimer's No. 3 D. M. Peterson, top sand 3,740 feet, initial production 135 bbls. per hour through three-quarters-inch choke, total depth 3,775 feet. Woodley Petroleum Corp.'s No. 1 George Thompson, top sand 3,627 feet, initial production 60 bbls. per hour through one-quarter-inch choke, total depth 3,683 feet.

Upshur County

Mudge Oil Co.'s No. 1 J. D. Richardson, oil sand 3,721-43 feet, initial production 274 bbls. in two hours through forty-two-sixty-fourths-inch choke, total depth 3,743 feet.

Van Zandt County

Pure Oil Co.'s No. 5 C. H. Cannon, initial production on eleven-sixteenths-inch choke 96 bbls., total depth 2,940 feet. Same company's No. 3 Ella York, initial production on eleven-sixteenths-inch choke 118 bbls., total depth 2,917 feet.

Average daily production week ending May 9:

Boggy Creek	2,510
Cedar Creek	12
Currie	259
Hill County	30
Mexia	3,183
Nigger Creek	131
Powell	4,329
Richland	116
Van	42,863
Wortham	458
East Texas fields—	
Kilgore	120,885
Lathrop	52,25u
Joiner	95,745
Total	268,880
Total all fields	322,771
Week ended May 2	396,705
Decrease	79,934

COMPLETIONS IN EAST CENTRAL TEXAS

Cass County

S. D. Miller's No. 1 M. Felkner, dry and abandoned, total depth 2,373 feet.

Cherokee County

Sinclair Oil & Gas Co.'s No. 1 Thomas McRae, dry and abandoned, total depth 3,976 feet.

Gregg County

Arkansas Fuel Oil Co.'s No. 5-A F. K. Lathrop, oil sand 3,588-97 feet, initial production 148 bbls. per hour on 1-inch choke, total depth 3,605 feet. Badgett and Cooper's No. 1 C. C. Clemons, oil sand 3,632-53 feet, initial production 1,700 bbls. in 15 hours on eleven-sixteenths-inch choke, total depth 3,670 feet. Capital Production Co.'s No. 1 L. Osborne, top sand 3,750 feet, dry and abandoned, total depth 4,010 feet. Cranfill & Reynolds' No. 2 Blackman, top sand 3,605 feet, initial production estimated 200 bbls. per hour through 1-inch tubing choke, total depth 3,620 feet. Same operators' No. 1 F. E. McGrede, top sand 3,605-46 feet, initial production 1,640 bbls. in eight hours through 2½-inch tubing choke, total depth 3,646 feet.

Eslick and Little's No. 1 W. R. Nicholson, oil sand 3,659-74 feet, initial production 16 bbls. per hour on one-eighth-inch choke, total depth 3,674 feet. Gibson and Adams' No. 1 Collier, top sand 3,538 feet, initial production 75 bbls. in 30 minutes through three-quarters-inch tubing choke, total depth 3,616 feet. C. C. Julian's No. 1 J. M. England, top sand 3,532 feet, initial production 300 bbls. first 45 minutes open, total depth 3,570 feet. Harry Elliott's No. 2 Andrews, top sand 3,657 feet, initial production 70 bbls. per hour through one-quarter-inch choke, total depth 3,665 feet. Magnolia Petroleum Co.'s No. 1 J. C. McKinley, oil sand 3,627-36 feet, initial production 470 bbls. per hour based on 15 minutes' gauge through one-quarter-inch line open and 1-inch choke, total depth 3,636 feet. Mazda Oil Co.'s No. 1 W. W. Cotton, top sand 3,651 feet, initial production 212 bbls. first 10 minutes open, total depth 3,659 feet.

H. G. Oliphant's No. 1 Willis Smith, top sand 3,569 feet, no gauge, total depth 3,593 feet. John Olvey and others' No. 1 Bun E. Rodden, oil sand 3,546-68 feet, initial production 2,016 bbls. in 12 hours through 4¾-inch tubing choke, total depth 3,590 feet. Shasta Oil Co.'s No. 1 Arthur Christian, oil sand 3,580-3,610 feet, initial production 1,000 bbls. in two hours, total depth 3,610 feet.

Shell Petroleum Corp.'s No. 1 J. A. Knowles, top sand 3,652 feet, initial production 180 bbls. per hour through three-quarters-inch choke on tubing, total depth 3,658 feet. Same corporation's No. 1 B. Watson, top sand 3,590 feet, initial production 200 bbls. per hour through 2½-inch tubing choke, total depth 3,652 feet. Stanolind Oil Co.'s No. 1-A W. M. Harley, oil sand 3,543-58 feet, initial production 2,413 bbls. in 22 hours on eleven-sixteenths-inch choke, total depth 3,558 feet. Texas Unity's No. 2 I.&G.N. (right of way), top sand 3,560 feet, initial production 220 bbls. per hour through tubing open, total depth 3,600 feet.

Limestone County

Obyrne and Chapman's No. 1 S. W. Hancock, dry and abandoned, total depth 1,168 feet.

Marion County

Sinclair Oil & Gas Co.'s No. 1 Dave Coulter, dry and abandoned, total depth 3,909 feet.

Nacogdoches County

Starks and others' No. 1 Langford, dry and abandoned, total depth 3,879 feet.

Rusk County

Dan Brooks, trustee's No. 1 Alford, dry and abandoned, total depth 3,815 feet. Burton's No. 2 E. B. S. Florey, top sand 3,670 feet, initial production 40 bbls. per hour through three-quarters-inch tubing choke, total depth 3,673 feet. Roy I. Carter's No. 2 Giles, sand 3,712-59 feet, initial production 125 bbls. per hour pinched through casing, total depth 3,759 feet. Cranfill & Reynolds' No. 1 Cox, sand 3,624-54 feet, initial production 150 bbls. per hour through tubing, total depth 3,712 feet. East Texas Refining Co.'s No. 1 Pool, sand 3,682-3,720 feet, initial production 175 bbls. per hour through tubing, total depth 3,730 feet.

TEXT OF NEW CONSERVATION LAW BEFORE THE TEXAS LEGISLATURE

AUSTIN, Tex., May 11.—A new oil conservation law was offered in the house this week by Representative A. M. Howsley of Albany. The bill is sponsored by J. D. Collett, Ed Landreth and C. F. Roeser of Fort Worth, giving the Railroad Commission enlarged powers to order and enforce proration and making it more difficult to obtain an injunction setting aside such orders.

The principal features of the bill follow:

The production of oil in Texas in excess of the current reasonable market demand for current use and consumption shall constitute waste and is prohibited. The Railroad Commission is directed to ascertain from time to time the reasonable market demand for current use and consumption and to promulgate and enforce rules, regulations and orders and do all things necessary to prevent such waste.

Whenever the full production of oil from any pool is or can only be obtained under conditions resulting in the waste of oil or gas or in the wasteful dissipation of the gas energy or water drive of the pool, or whenever, because of lack or shortage of reasonable market demand for current use and consumption for oil from the pool or of transportation facilities for moving same to market, certain producers or operators are unable to market their full production from the pool and are thereby compelled either to permit oil and gas under their land to remain unproduced or be drained from their properties by those having transportation facilities or a market or to produce and run it to storage, thus resulting in waste, the Railroad Commission is authorized, taking into consideration the correlative rights of all property owners in the pool, to limit or restrict the production from the pool to such an extent and in such manner as to lessen or prevent waste; and it shall be no defense against any order of the commission that an individual producer, in violating the order, is not producing waste by the operations on his own leases or properties.

The unnecessary waste of gas or the gas energy of an oil pool is prohibited. However, it is not the intention to require repressuring of an oil pool, nor to require the owners of separate properties in an oil pool to unitize them under one management. The Railroad Commission is authorized to make such rules and do all things necessary to prevent such waste.

Article 6,008 of the Revised Statutes of Texas for 1925 would be amended so as to read as follows:

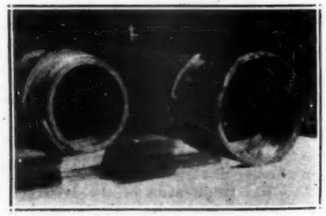
"Gas to be confined—Any person, copartnership or corporation in possession, either as owner, lessee, agent or manager, of any well producing natural gas only, in order to prevent the said gas from wasting by escape shall within five days after penetrating the gas-bearing rock in any well, shut in and confine the gas until the gas which is produced therefrom shall be utilized for one or more of the following purposes: Light, fuel or power; provided, that the Railroad Commission may permit the use of such gas for the purpose of being introduced into an oil-bearing stratum in order to maintain or increase the rock pressure or otherwise increase the ultimate recovery of oil from such stratum."

If any party having a substantial interest in any property directly affected by any order by the Railroad Commission, or if any party whose conduct is regulated by such an order is dissatisfied with any such order, he may file a court petition setting forth his objection. In all trials the burden of proof shall rest on the plaintiff. No temporary injunction shall be granted without a hearing after 10 days' notice to the commission, and if on final hearing the order complained of be held valid, all such injunctions shall be vacated and dissolved. Either party has the right of appeal, to be at once returnable to the appellate court, and in both trial and appellate courts the action shall have precedence.

If any person produces oil in excess of the amount allowable under any order during the time it is being reviewed by the courts and the order shall be held valid, he shall thereafter reduce the production below the amount which otherwise would be allowable to the extent that the amount of reduction will equal the amount of oil produced in excess of the orders.

WROUGHT IRON TUBING HAS BRASS CONNECTIONS

When L. B. Holland, production superintendent for the Phillips Petroleum Corp., Oklahoma City Field, was visiting near Bradford, Pa., last fall he found some pieces of old tubing that are of interest because of the methods used in manufacturing connections.



The accompanying cut shows the male and female ends of this 2-inch standard tubing. These connections are made of brass and carry six threads per inch and apparently they were shrunk on to the wrought iron pipe. To make up this pipe a spanner wrench is used instead of the pipe wrench now in common use in the oil fields.

These pieces of pipe were located on the property of J. C. Looker, near Bradford, and it is not known when they were last in use or how long the strings of tubing were that they used in the old wells, but it is presumed that this tubing could be made up into full length strings for the wells of that territory which were about 1,500 feet deep.

A New Safety Drill Collar

Pat. Pending 487553

Other Brewster Products

Perfection Core Barrel; Core Barrel Cutter Heads for both hard and soft formations; A.P.I. Shouldered Tool Joints.

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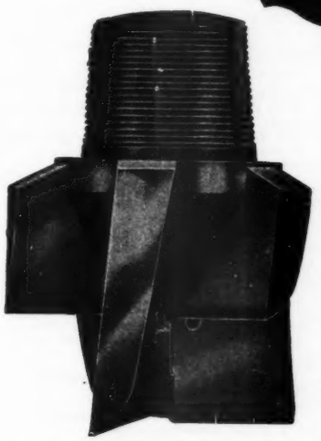
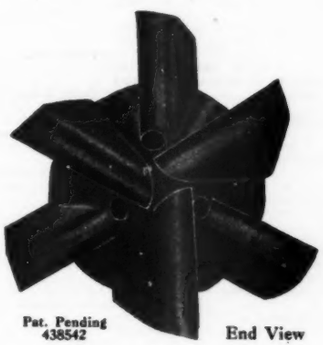


Six Blade Straight Hole Bit



Pat. Pending 438542 End View

Positive . . . . automatic . . . . prevents a bit from backing off going into the hole. This Drill Collar has a positive bit lock for any style bit. No more grief from "he failed to make up the bit." Made in all sizes. A.P.I.

Manufactured by

The Brewster COMPANY~INC.
Shreveport, Louisiana

Ampco Bronze Fittings For Spark Prevention At Sinclair Wild Well

By L. G. E. Bignell
Petroleum Engineering Editor

With the fire shot out at Sinclair Oil & Gas Co.'s No. 1 Cole well near Gladewater, Tex., after burning nine days, preparations are being made to bring the well under control by capping the casing and installing a christmas tree of high-pressure fittings and valves.

The last 200-pound shot of nitroglycerin bent the casing over so that it is going to be difficult to make connections to it and it seems probable that the top joint of casing will have to be removed and a new piece of casing substituted.

To do all this work will require a considerable amount of hammering, screwing and cutting of pipe and material at the well head and to prevent the creation of a spark and again setting fire to the oil and gas flowing from this well tools made of special metal known as "Ampco bronze" have been delivered to the well by airplane from Milwaukee, Wis.

This metal has been used for many years to make tools and parts to be used where fire hazards exist around refineries, gasoline plants, loading racks, tank farms, in production operations and anywhere that sparks created by two metals striking together is dangerous. This special bronze alloy, which is hard enough to cut steel, is absolutely nonsparking and therefore safe to use with other metals.

This order, placed by the Sinclair Oil & Gas Co. production department in Tulsa with the local factory representative of Ampco Metal, Inc., Milwaukee, Wis., covers an assortment of hammers, wrenches, stillsons, sledges, etc., and some of them of such size that they had to be made special for this order. This required day and night work at the factory and when the order was ready for shipment it was transported to Dallas, Tex., from Chicago municipal airport by plane, and from Dallas to Gladewater, Tex., by truck.

It was reported by the officials of the Chicago municipal airport that the shipment was the largest commodity shipment ever handled out of that port, and the plane selected was of large capacity to afford space and capacity for this load of special tools. It was necessary for the pilot to fly all night in making this trip so that no time would be lost in delivering the tools at the well, and he arrived at the Dallas airport in the morning, where the shipment was immediately transferred to trucks for the journey to their destination.

C. M. HOLBROOK DIES

Charles M. Holbrook, purchasing agent of the National Transit Pump & Machine Co., died at his home in Oil City, Pa., last week. He was 73 years old and had been connected with the company for a long time.

WEST TEXAS FIELDS

(Continued from Page 49)

4,454 feet, makes head every three or four days.

Menard County

Voss and Bryson and others' No. 1 Brandeberger, dry and abandoned, total depth 804 feet.

Pecos County

Cardinal Oil Co.'s No. 8-E Tippett, top pay 460 feet, initial production 240 bbls. on pump, total depth 487 feet. Cosby Producing & Royalty Co.'s No. 1 Riser, dry and abandoned, total depth 1,675 feet. C. L. Dittman's No. 2 Eaton, location abandoned. Messenger and others' No. 1 Butz, temporarily abandoned, total depth 1,292 feet.

Upton County

Weekly Oil Co.'s No. 2 McClintic, top pay 2,845 feet, initial production 540 bbls. in eight hours, total depth 3,027 feet. Shot 590 quarts 2,845-3,027 feet.

Winkler County

Magnolia Petroleum Co.'s No. 1 Bashara, dry and abandoned, total depth 3,481 feet.

NORTH TEXAS PRODUCTION
Week Ending May 11, 1931

Panhandle district—	
Carson County	4,358
Gray county	41,946
Hutchinson County	8,299
Moore County	843
Potter County	0
Wheeler County	227
Total production this week	55,673
Total production last week	56,611
Decrease	938
Wichita Falls district—	
Archer County	11,906
Baylor County	465
Clay County	604
Cooke County	1,697
Foard County	46
Jack County	1,152
Haskell County	25
Montague County	3,372
Throckmorton County	326
Wilbarger County	9,926
Wichita County	17,896
Young County	12,748
Total production this week	60,163
Total production last week	61,707
Decrease	1,544
Ranger district—	
Brown County	3,541
Callahan County	2,478
Coleman County	1,421
Comanche County	711
Palo Pinto County	341
Eastland County	3,112
Shackelford County	3,783
Stephens County	4,499
Total production this week	19,886
Total production last week	20,211
Decrease	325

PRODUCERS FORM ASSOCIATION

FINDLAY, Ohio, May 11.—Northwestern Ohio oil producers have formed an association, which will have its headquarters in Findlay. H. McClure, Lima, was elected president; W. Elmer Stephenson, Findlay; J. A. Neiset, Gibsonburg; and A. T. Carpenter, Wayne, vice presidents, and M. B. Chidester, Bowling Green, secretary. The association will seek to stimulate use of products of Lima crude oil.

EAST CENTRAL TEXAS WILDCATS

(Continued from Page 50)

GREGG COUNTY

Angeline & Burkett's No. 1 J. G. McGrede, 298 ft. from E and 155 ft. from S of Lot No. 3, Dolores Sanches Sur. ... Shut down 3,611 ft.

Arkansas Fuel Oil Co.'s No. 1 J. C. and R. S. McKinley, 250 ft. from N and 175 ft. from E of 160-ac. tract and 87-ac. lease, G. W. Hooper Sur. ... Drlg. 2,121 ft.

Arkansas Fuel Oil Co.'s No. 1 G. A. Castleberry, 250 ft. from S and 250 ft. from W of 52-ac. tract and lease, Dolores Sanches Sur. ... Drlg. 2,775 ft.

Arkansas Fuel Oil Co.'s No. 2 P. D. Harrison, 282 ft. S and 143 ft. E of SE cor. of Tenery 40-ac. tract, William Robinson Sur. ... Derrick pattern.

Arkansas Fuel Oil Co.'s No. 1 Vonie Calvin, 300 ft. from S and 300 ft. from W of 61-ac. lease and 119-ac. tract, Henry Hathaway Sur. ... Rig up.

P. P. Ash et al's No. 1 A. H. Tubbs, 1,550 ft. from S and 4,120 ft. from E of survey, Dolores Sanches Sur. ... Derrick.

Ball et al's No. 1 L. D. Campbell, 540 ft. from N and 219 ft. from E of 72½-ac. tract, David Ferguson Sur. ... Derrick.

Barnsdall Refining Co.'s No. 1 J. McGrede, 150 ft. from E and 150 ft. from S of 100-ac. lease and W offset to Pilot Oil Co.'s No. 1 McGrede, Dolores Sanches Sur. ... Coring 3,604 ft.

Bell & Graddy's No. 1 M. George (or Daniels), 225 ft. S and 650 ft. W of 26-ac. tract, Mary Van Winkle Sur. ... Drlg. 2,618 ft.

Blackstock et al's No. 1 F. E. McGrede, 150 ft. from E and 150 ft. from S of 36-ac. tract and 10-ac. tract, Dolores Sanches Sur. ... Drlg. 3,450 ft.

Bridwell et al's No. 1 D. L. Magrill, 169 ft. from E line and 150 ft. from S line of 45-ac. tract, Dolores Sanches Sur. ... Set 6⅝-in. csg. 3,590 ft.

B. L. Brookin's No. 1 J. M. Tuttle, 150 ft. from N and 205 ft. from E of 12½-ac. lease, William H. Castleberry Sur. ... Rig up.

Callahan, Thompson et al's No. 1 Fenn, 463 ft. from N and 150 ft. from E, 778 ft. from S of 44.5 ac. tract, David Ferguson Sur. ... Derrick.

Campbell et al's No. 1 G. M. Collins, 160 ft. from E and 160 ft. from S of 84-ac. tract, G. W. Hooper Sur. ... Location.

Cranfill & Reynolds' No. 1 Clayton heirs, 330 ft. from W of 20-ac. lease, L. B. Outlaw Sur. ... Location.

Corley and Blair's No. 1 W. E. Bumpers, 150 ft. from E and 150 ft. from S of 10-ac. lease and 20-ac. tract, William H. Castleberry Sur. ... Drlg. 3,380 ft.

Tom David et al's No. 1 W. S. Pryor, 200 ft. from S and 200 ft. from W of 152-ac. tract, 2,600 ft. from E and 2,350 ft. from N of survey, Hamilton McNutt Sur. ... Derrick.

Davis and Russell's No. 1 M. E. Anderson, 150 ft. from E and 75 ft. from S of 3-ac. lease in Kilgore Townsite, Mary Van Winkle Sur. ... Drlg. 3,431 ft.

Daisy Oil Co.'s No. 1 Mrs. H. B. Ware, 1,000 varas from N and 350 ft. from W of survey, Avery B. Johnson Sur. ... Drlg. 3,250 ft.

Delaney et al's No. 1 Homer Clemens, 396 ft. from N and 356 ft. from W of 22½-ac. tract, Dolores Sanches Sur. ... Drlg. 2,962 ft.

T. H. R. Duncan et al's No. 1 B. Duncan, 420 ft. from N and 514 ft. from E of 28-ac. tract, G. F. Penn Sur. ... Building rig.

Harry Elliott et al's No. 1 Woodley Jones, 2,125 ft. from N line and 3,720 ft. from E line of William H. Castleberry Sur. ... Drlg. 106 ft.

E. A. Estick et al's No. 2 Springhill Church, 150 ft. from E and 150 ft. from S of 15-ac. lease, W offset to Mid-Kansas, Dolores Sanches Sur. ... Shut down 3,623 ft.

Harry Elliott's No. 1 McNeely, 150 ft. from N and 150 ft. from E of 7.73-ac. tract, W. P. Chisum Sur. ... Drlg. 1,710 ft.

Flannagan Prod. Co.'s No. 1 A. J. Green, 200 ft. from E and 150 ft. from S of 35-ac. tract, G. W. Hooper Sur. ... Set 6⅝-in. csg.; T. D. 3,576 ft.

F. H. E. Oil Co.'s No. 1 Julia Flemister et al, 150 ft. from E and 150 ft. from S of 27.3-ac. tract, G. W. Hooper Sur. ... Top sand 3,599 ft.; set 6⅝-in. csg

Flannery & Bradley's No. 1 W. H. York, 150 ft. from S and center E and W of 18½-ac. tract, William Carlton Sur. ... Fishing 3,515 ft.

Merren & Hays' No. 1 Hawkins, 160 ft. W of S line of Hawkins 325-ac. from SE cor. of same, thence 150 ft. at right angles, W. P. Chisum Sur. ... Drlg. 2,612 ft.

Gulf Production Co.'s No. 1 M. O. Shepherd, 728 ft. from N and 330 ft. from W of 38-ac. lease, George R. Sims Sur. ... Moving in material.

Gulf Production Co.'s No. 2 Mary Chavles, 4,150 ft. from E line of survey and 2,100 ft. from N of county line, W. P. Chisum Sur. ... Drlg. 1,147 ft.

Gulf Production Co.'s No. 1 L. S. Fishburn, 330 ft. N and 330 ft. W of NE cor., W. C. Alvice Sur., Francis W. Johnson Sur. ... Drlg. 1,210 ft.

Gulf Production Co.'s No. 1 Muckelroy, 330 ft. from W line and 4,700 ft. from S line of survey, J. S. Carrithers Sur. ... Drlg. 3,007 ft.

Gulf Production Co.'s No. 1 Della Crim, 1,150 ft. from E of survey and 5,350 ft. N of county line ... Drlg. 2,613 ft.

Gulf Production Co.'s No. 1 Spear, 150 ft. out of NE cor. of survey, W. P. Chisum Sur. ... Drlg. 2,962 ft.

Gulf Production Co.'s No. 2 A. Spear, 330 ft. from W and 3,900 ft. from N of survey, Mary Van Winkle Sur. ... Drlg. 2,650 ft.

Harper Petroleum Corp.'s No. 1 Woodley Jones, 2,900 ft. from N line and 3,900 ft. from E line of William H. Castleberry Sur. ... Derrick.

O. L. Heckman's No. 1 C. H. Moore, 450 ft. W and 150 ft. N of NE cor. of E. M. Woods 39.3-ac. tract, Martha Dillard Sur. ... Derrick.

Hawkeye Pet. Co.'s No. 1 R. S. and J. C. McKinley, 250 ft. from S and 150 ft. from W of survey, Dolores Sanches Sur. ... Drlg. 1,440 ft.

Heydrick et al's No. 1 Lynie McGrede, 1,000 ft. from N and 330 ft. from E of McGrede 187 acres, Dolores Sanches Sur. ... Base Pecan Gap 2,990 ft.; coring

Howard and Russell's No. 1 Stone, 150 ft. from N and 150 ft. from E of 100-ac. tract, Bailey Anderson Sur. ... Location.

Heep Oil Co.'s No. 1 S. B. Hall, 150 ft. from E and 150 ft. from S of lease and survey, David Dainwood Sur. ... Location.

Humble Oil & Ref. Co.'s No. 1 J. A. Knowles, 4,150 ft. from W line and 4,150 ft. from S line of survey, Mary Van Winkle Sur. ... Drlg. 2,565 ft.

Humble Oil & Ref. Co.'s No. 1 T. M. Armstrong, 1,353 ft. from N and 150 ft. from E of 603-ac. tract, Lewis J. Rigsby Sur. ... Top Pecan Gap 2,440 ft.

Humble Oil & Ref. Co.'s No. 1 A. Carter, 780 ft. from S and 150 ft. from W of 92-ac. tract, David Ferguson Sur. ... Spudding.

Humble Oil & Ref. Co.'s No. 1 D. C. Johnson, 2,165 ft. from S and 150 ft. from W of 62.5-ac. tract and survey, John R. Crosby Sur. ... Drlg. 2,200 ft.

Humble Oil & Ref. Co.'s No. 1 H. M. Lawrence, 540 ft. from N and 219 ft. from W of 100-ac. tract, David Ferguson Sur. ... Building derrick.

Hudson and McCamey's No. 1 Smith, 150 ft. S and 150 ft. W of W. Smith 43-ac. tract, J. S. Carrithers Sur. ... Top sand 3,588 ft.; T. D. 3,612 ft.

Hurburt and Brown's No. 1 L. Mackey, 990 ft. from E and 990 ft. from S of 269-ac. tract, 1,000 ft. from W and 990 ft. from S of survey, G. Y. Chambers Sur. ... Drlg. 2,770 ft.

H. P. Key's No. 1 King, 150 ft. out of SE cor. of 48-ac. tract, W. P. Chisum Sur. ... Shut down 2,250 ft.

Kimsey-Trimble's No. 1 Griffith Davis, 922 ft. E of N line of Griffith Davis 119.5-ac. tract from NW cor. of same and 145 ft. S at right angles, W. P. Chisum Sur. ... Shut down 1,050 ft.

Lacey et al's No. 1 T. D. Anderson et al, 150 ft. from S and 150 ft. from W of 13-ac. tract, G. W. Hooper Sur. ... Rig up.

J. K. Livingston Oil Co.'s No. 1 D. C. Johnson, 200 ft. from N and 150 ft. from E of survey, Martha Dillard Sur. ... Derrick.

Lucey Petroleum Corp.'s No. 1 Ranfle Christian, 165 ft. from E line and 160 ft. from S line of 37-ac. lease, G. W. Hooper Sur. ... Top sand 3,564 ft.; set 6⅝-in. csg. 3,554 ft.

Magnolia Petroleum Co.'s No. 1 W. B. Goyne, 150 ft. from S and 150 ft. from W of 31.7-ac. tract, J. T. McDaniel Sur. ... Location.

Magnolia Petroleum Co.'s No. 1 Hughey, 330 ft. from N and 330 ft. from W of 80-ac. lease, William McCurry Sur. ... Rigging up.

Meck and King's No. 1 Harmony Grove School, 270 ft. from S and 150 ft. from W of 3.7-ac. tract, Mowry Irwin Sur. ..... Drlg. 690 ft.

Mid-Kansas Oil & Gas Co.'s No. 2 Barton, 685 ft. S along W line and Hollingsworth survey, from NE cor. W. P. Chisum Sur., thence 150 ft. E at right angles, S. P. Hollingsworth Sur. ..... Derrick.

Mid-Kansas Oil & Gas Co.'s No. 1 Durham, 150 ft. from N and 150 ft. from E. W. P. Chisum Sur. ... Spudding.

Mid-Kansas Oil & Gas Co.'s No. 1 Hughey, 150 ft. from N and 150 ft. from W of tract and survey, James Hilliard Sur. ..... Rig up.

Mid-Kansas Oil & Gas Co.'s No. 1 Jack Castleberry, 730 ft from S and 110 ft. from W of tract, Dolores Sanches Sur. ..... Set 6⅝-in. csg. 3,591 ft.

Mid-Kansas Oil & Gas Co.'s No. 1 E. M. Nettleton, 150 ft. from S and N offset to Republic's No. 1 Fisher, John Ruddle Sur. ..... Set 6⅝-in. csg. 3,452 ft.

Mid-Kansas Oil & Gas Co.'s No. 1 J. J. Castleberry, 150 ft. from S and 150 ft. from W of most southerly SW cor. tract, Dolores Sanches Sur. ..... Set 6⅝-in. csg. 3,591 ft.

Mid-Kansas Oil & Gas Co.'s No. 1 Burton, 150 ft. from N and 150 ft. from W of 193.9-ac. tract and survey, Hollingsworth Sur. ..... Set 6⅝-in. csg.; T. D. 3,615 ft.

Owens et al's No. 1 C. E. Davis, 200 ft. from N and 340 ft. from E of 37-ac. tract and 18.3-ac. lease, William H. Castleberry Sur. ..... Derrick and material.

Pilot Oil Co.'s No. 1 Maggie Magrill, 125 ft. N and 230 ft. W of most southern SW cor. of Ike Denson tract, Dolores Sanches Sur. ..... Drlg. 2,965 ft.

Pace et al's No. 1 C. Harrell estate, 300 ft. from E line and 150 ft. from N line of 150-ac. tract, A. M. Coleman Sur. ..... Drlg. 2,365 ft.

Phillips et al's No. 1 M. T. Cole, 200 ft. out of SW cor. of M. T. Cole 320-ac. tract, Judson Meador Sur. ..... Shut down 1,700 ft.

Prairie Oil & Gas Co.'s No. 1 Elder, 800 ft. from N and 800 ft. from E lines of survey, William McCurry Sur. ..... Rig up.

Refugio Oil Corp.'s No. 1 Barber, 150 ft. from N line and halfway between E and W line of lease, Warraner Sur. ..... Drlg. 2,500 ft.

Rex Drlg. Co.'s No. 1 J. H. and W. E. McHaney, 350 ft. from E and 250 ft. from S of 80-ac. tract, Henry Hathaway Sur. ..... Set 113 ft. 10-in. csg.

Ross et al's No. 1 Fehnear and Thomas, 150 ft. from S line of 6⅝-ac. lease, Charles Alexander Sur. ..... Location.

Roeser and Pendleton's No. 1 J. R. Fenton, 200 ft. from S and center of E and W of 17-ac. lease, Dolores Sanches Sur. ..... Set 6⅝-in. csg. 3,593 ft.; T. D. 3,599 ft.

Roy Roberts et al's No. 1 L. M. Colburn, 150 ft. from E and 150 ft. from S of 45-ac. lease, 5,700 ft. from E and 850 ft. from N of survey, Henry Hathaway Sur. ..... Derrick.

C. Rosenfield et al's No. 1 J. A. Knowles, 700 ft. from E. 1,250 ft. from N. William Lyles Sur. ..... Shut down 2,732 ft.

Rush Bros. et al's No. 1 Arthur Christian, 225 ft. S and 170 ft. E of SE cor. of Randle Christian 32-ac. tract, G. W. Hooper Sur. ..... Drlg. 990 ft.

Rush Bros.' No. 1 W. M. Harley, 150 ft. from NE and 150 ft. from SE of 10-ac. lease, William Robinson Sur. ..... Sand 3,582-3,616 ft.; T. D. 3,616 ft.

Sabine Oil & Gas Co.'s No. 1 Harris, 3,500 ft. E and 3,500 ft. N of NE cor. of S. Lewis Sur., Mary Van Winkle Sur. ..... Derrick.

Shell Petroleum Corp.'s No. 2 J. A. Knowles, 150 ft. from E and 400 ft. from S of survey, Allen Norris Sur. ..... Location.

Sinclair Oil & Gas Co.'s No. 1 Mathie Moncrief, 840 ft. from N and 168 ft. from W of 56-ac. tract, 657 ft. N of road, W. H. Castleberry Sur. ..... Rig up.

Smith et al's No. 1 J. B. Doby, 982 ft. from E and 150 ft. from S of 170-ac. tract, William H. Castleberry Sur. ..... Rig up.

E. L. Smith's No. 1 Cole, 893 varas S along E line of Samuel Brooks Sur. from NE cor. of same, thence 107 varas E at right angles, J. Meador Sur. ..... Moving in.

Smitherman and Greer's No. 1 George Jones et al, 330 ft. from S and 359 ft. W of 100-ac. tract and 50-ac. lease, G. W. Hooper Sur. ..... Drlg. 2,927 ft.

Sinclair Oil & Gas Co.'s No. 1 M. T. Cole, 2,640 ft. from N and 2,742.2 ft. from W line of survey, Samuel Brooks Sur. ..... Fire shot out; preparing to shut in.

Smith Ref. Co.'s No. 1 J. A. Knowles, 150 ft. from S. 150 ft. from NW of 75-ac. tract, 5,200 ft. from W. 7,700 ft. from N, Mary Van Winkle Sur. ..... Derrick.

Sun Oil Co.'s No. 2 J. R. Beal, 192 ft. from N and 250 ft. from E line of lease, W. P. Chisum Sur. ..... Drlg. 2,985 ft.

Sun Oil Co.'s No. 1 G. W. Tate, 250 ft. from N and 250 ft. from E of 64-ac. lease and tract, William H. Castleberry Sur. ..... Drlg. 2,725 ft.

Stanclind and Simms Oil Co.'s No. 1 J. J. Flewellen, 353 ft. from N and 950 ft. from E of 200-ac. lease and 987-ac. tract, Marshall Mann Sur. ..... Location.

C. S. Thomas et al's No. 1 C. B. Everett, 300 ft. from N and 200 ft. from E of 30.25-ac. tract, John Ruddle Sur. ..... Derrick.

J. Thomas Cox et al's No. 1 Finley and Thomas, 150 ft. from N line and 150 ft. from W line of 3½-ac. lease and 50-ac. tract, Charles B. Alexander Sur. .... Derrick.

Texas Pacific Coal & Oil Co.'s No. 1 fee, 330 ft. from S and 330 ft. from W tract and survey, George Hampton Sur. ..... Coring 3,546 ft.

Paul Vitek et al's No. 1 Louise Osborne, 150 ft. from E. 150 ft. from S and W 46 acres of 84-ac. tract, 2,000 ft. from W, 450 ft. from S, R. R. Bobbett Sur. ..... Drlg. 3,602 ft.

Wainwright-West Oil Co.'s No. 1 Ben Watson, 150 ft. from E and 181 ft. from N of 18.75-ac. tract and a 3-ac. lease, J. S. Carrithers Sur. ..... Drlg. plug; set 6⅝-in. csg.

Walker and Harrison's No. 1 E. L. Walker, 1,025 ft. from N and 550 ft. from W of survey, Martha Dillard Sur. ..... Rig up.

Wise and Jackson's No. 1 F. J. Glover, 350 ft. from N and 125 ft. from E line of survey, George Melton Sur. ..... Top sand 3,692 ft.

H. M. Wages et al's No. 1 Finley and Thomas, 165 ft. from E and 150 ft. from S of 10-ac. lease, Charles H. Alexander Sur. ..... Rig up.

Wise and Jackson's No. 1 Wash Dickey, 330 ft. from S and 200 ft. from E of survey, W. H. Johnson Sur. ..... Top sand 3,692 ft.; set csg.

Woodley Petroleum Co.'s No. 1 Laura Walker et al, 475 ft. from E and 235 ft. from S of 45-ac. tract, Dolores Sanches Sur. ..... Drlg. 2,781 ft.

Whitney-Cowanaugh's No. 1 Ben Watson, 300 ft. E of Marine Oil Co.'s No. 1 Art Mitchell, J. S. Cathers Sur. ..... Top sand 3,586 ft.; T. D. 3,620 ft.

Yount Lee Oil Co.'s No. 1-B R. S. McKinley, 1,993 ft. from S and 2,440 ft. W of NE cor. of 212-ac. tract, William Robinson Sur. ..... Drlg. 1,590 ft.

Yount Lee Oil Co.'s No. 1 Isaac Denson, 369 ft. from S and 684 ft. from W of 64-ac. tract, Dolores Sanches Sur. ..... Drlg. 3,498 ft.

Yount Lee Oil Co.'s No. 1 C. E. Fenton, 619 ft. from E line and 742 ft. from S line of 84-ac. tract, Dolores Sanches Sur. ..... Drlg. 2,655 ft.

Yount Lee Oil Co.'s No. 1 Bun Rodden, 610 ft. from N and 215 ft. from W of 22-ac. tract, William Robinson Sur. ..... Drlg. 2,963 ft.

Yount Lee Oil Co.'s No. 1 Thrasher and Stuckey, 399 ft. from N line and 331 ft. from E line of 80-ac. lease, G. W. Hooper Sur. ..... Derrick.

HENDERSON COUNTY

Arcadia Refining Co.'s No. 1 J. M. Dean, 150 ft. from S and 150 ft. from W of 42.75-ac. tract, Simon Boone heirs Sur. ..... Spudded.

Westside Investment Co.'s No. 1 Thornhill, 450 varas from W and 400 varas from N line of survey, James Spivey heirs Sur. ..... Location.

LAMAR COUNTY

K. O. Bundy et al's No. 1 La Gatle, 200 ft. from N and 500 ft. from E of La Gatle tract, John V. Cherry Sur. ..... Moving in rig.

Everett & Allen's No. 1 Guest, 250 ft. S and 2,046 ft. E of 100-ac. tract, L. Roberts Sur. ..... Fishing; T. D. 2,615 ft.

MORRIS COUNTY

Dumas et al's No. 1 Tom Ball, 1,046 ft. from E and 248 ft. from S of 71-ac. tract, A. S. Young heirs Sur. ..... Derrick.

NACOGDOCHES COUNTY

Bunte et al's No. 1 A. F. Boatman, 330 ft. from S and 150 ft. from W of 67-ac. tract, William A. Moore Sur. ..... T. D. 495 ft.

E. L. Chapman's No. 1 Tilford Hunt, 1,250 varas from S line and 1,468 varas from W line of survey, Stephen Strode Sur. ..... Drlg. 3,215 ft.

Foreman and Weller's No. 1 W. Smith, 60 ft. NW of E line and 420 ft. S of road in 73.5-ac. tract, Hossea Y. Barbo Sur. ..... Derrick pattern.

Fuhram et al's No. 1 Robert Mattaner, NW cor. of 520-ac. tract, J. A. Cherino grant ..... Rig up.

Joiner and Henson's No. 1 Andy Legg, 330 ft. from N and 330 ft. from W of tract, John Durst Sur. .... Waiting on csg. 450 ft.

Joiner et al's No. 1 Reeves, 450 ft. from S and 350 ft. from W of survey, T. G. Loyd Sur. ..... Location.

J. C. McNeil et al's No. 1 Hayter estate, 1,000 ft. E of Laco Creek and 300 ft. S of Nacogdoches and Jacksonville Highway De Las Santos-Coy Sur. ..... Set 400 ft. 10-in. csg.

RAINS COUNTY

Berry and Hale's No. 1 Ownsby, 150 ft. N and 1,100 ft. from E of most easterly SE cor. of survey, Alexander Sur. ..... Set surface pipe 130 ft.

Westbrook Oil Co.'s No. 1 William Cates, 150 ft. N and W of NW cor. of E. S. Knight 46-ac. tract and on Cates 266-ac. tract, Calvin Gage Sur. ..... Drlg. 3,725 ft.

RED RIVER COUNTY

Everett & Allen's No. 1 Bryan, 1,200 ft. SW of NE cor. of Bryan 130 acres, P. Vaughn Sur. ..... Rig up.

Everett & Allen's No. 1 E. Howison, 225 ft. S, 185 ft. W of 79-ac. tract, William Humphreys Sur. ..... Shut down 1,460 ft.

Droppleman and Bunely's No. 1 J. W. Cunningham, 250 ft. E and 250 ft. S of 180-ac. tract, S. B. Shi Sur. ..... Moving in larger rig.

Pearsons et al's No. 1 J. R. Dellahunty, 500 ft. from N of Isaac Moore Sur. and 200 ft. E of E line of Robert Glass Sur. ..... Shut down 330 ft.

KILGORE AREA—RUSK COUNTY

Abercrombie's No. 1 E. Cantrell, 740 ft. from W line of Cantrell 53-ac. tract in Robert W. Smith Sur., and 148 ft. from S line ..... Top sand 3,682 ft.; drlg. plug.

Burton Drlg. Co.'s No. 3 E. B. S. Florey, 250 ft. out of NE cor. of Burton Florey 50-ac. lease, Peter Holmes Sur. ..... Location.

Blackwell Oil & Gas Co.'s No. 1 Moore, 4,050 ft. from W and 4,450 ft. from N of survey ..... Derrick.

Calloway et al's No. 1 Harmon, 1,800 ft. from E and 6,525 ft. from N of survey, F. Cordova Sur. ..... Rig up.

Cox and Hamon's No. 3 D. M. Peterson, 150 ft. from N and W lines of 40-ac. tract, Isaac Ruddle Sur. .... Moving in material.

Cromwell et al's No. 1 C. J. Bradberry, 565 ft. from S line of Bradberry 112-ac. tract and 154 ft. from E line of Robert W. Smith Sur. ..... Coring 3,670 ft.

Curtis and Loe's No. 1 J. S. Bean, 1,650 ft. from S, 200 ft. E of NW cor. of 314-ac. tract and lease, 4,925 ft. from S, 1,075 ft. from W. J. Lewis Sur. .... Shut down 3,200 ft.

East Texas Refining Co.'s No. 2 Wills, 200 ft. from N and 150 ft. from E of 80-ac. lease, W. P. Chisum Sur. ..... Cementing back.

Harry Elliott's No. 1 Carroll, 175 ft. from N and 200 ft. from E of 7-ac. tract, W. R. Cook Sur. ..... Location.

H. W. Elliott's No. 1 Ferrell, 150 ft. from N and 150 ft. from E of 8-ac. tract, W. M. Ryan Sur. ..... Drlg. plug.

Elsy Drlg. Co.'s No. 1 George Thompson, 150 ft. from N, 150 ft. from E of tract of 70 acres and 10-ac. lease, 400 ft. S, 500 ft. W, Henry Dobson Sur. ..... Shut down 2,850 ft.

Gulf Production Co.'s No. 1 Russell, 150 ft. from the N and W lines of the S. R. W. Smith Sur. ..... Set 144 ft. 10-in. csg.

Heep Oil Co.'s No. 1 Givens, 1,200 ft. from E and 210 ft. from S of survey, Robert W. Smith Sur. ..... Derrick.

Houston Oil Co.'s No. 1 Dora Wells, 150 ft. out of NE cor. of 25-ac. lease, Henry Hobson Sur. ..... Top sand 3,670 ft.; T. D. 3,673 ft.

Captain Lucey's No. 1 Maxwell, 600 ft. N and 200 ft. W of SW cor. of John Darley Sur. in the E. Collard Sur. ..... Shut down in sand 3,662 ft.

Lewis and Perkins' No. 1 Brock heirs, 150 ft. from the N and E lines of the R. W. Smith Sur. ..... Drlg. 3,207 ft.

Lewis and Selby's No. 1 Peagues, 150 ft. from the N and W lines of the George Cooper Sur. ..... Top sand 3,610 ft.; T. D. 3,620 ft.

C. H. Lyon's No. 1 Ladd, 177 ft. from N and 177 ft. from W of 2-ac. tract, Henry Hobson Sur. ..... Derrick.

Magnolia Pet. Co.'s No. 1 Bradbury, 150 ft. from the S and E lines of the lease in the N Robert W. Smith Sur. ..... Drlg. 3,300 ft.

Magnolia Pet. Co.'s No. 2 Dick Wells, W offset to Madden et al's No. 1 Mayfield in the Henry Hobson Sur. ..... Top sand 3,626 ft.; T. D. 3,627 ft.

Magnolia Pet. Co.'s No. 1 Florey, 150 ft. from N and E lines of tract, Peter Holmes Sur. ..... Plugging back to 3,647 ft.; tested 50 bbls. through 1-inch tubing choke.

Moser's No. 1 Buntyn, 554 ft. from N and 325 ft. from E of survey, the most northeasterly cor. of survey, J. C. Snow Sur. ..... Spudded; shut down.

Moody-Seagraves' No. 1 J. H. Palmer, 150 ft. out of NE cor. of lease, S offset to Markham and Dunning's No. 3 or 5-E Peterson, Robert E. Winn Sur. .. Testing.

Rector and Davis' No. 1 Brightwell, 2,300 ft. from S line and 225 ft. from W line of survey, Robert E. Winn Sur. ..... Drlg. 145 ft.

Republic Production Co.'s No. 1 Bean, 1,150 ft. from the N and 50 ft. from the W lines of the J. Lewis Sur. ..... Drlg. 2,655 ft.

Republic Production Co.'s No. 1 Christian, 1,850 ft. from the N and 920 ft. from the W lines of the N. Robert W. Smith Sur. ..... Drlg. 2,810 ft.

Sun Oil Co.'s No. 1 Ed Barker, 200 ft. from E and 200 ft. from S of 77-ac. lease, A. M. Ryan Sur. .... Swabbing.

Sun Oil Co.'s No. 1 Beal, 200 ft. from W and 200 ft. from S of Beal 180-ac. tract, W. P. Chisum Sur. .... Set 6⅝-in. csg.; T. D. 3,614 ft.

Sun Oil Co.'s No. 1 A. A. King, 225 ft. out of SE cor. of A. A. King 100-ac. lease, Peter Holmes Sur. ..... Location.

Stanolind Oil & Gas Co.'s No. 1 W. R. Terrell, 327 ft. S and 275 ft. from W of 50-ac. lease, E. G. Sevier Sur. ..... Swabbing.

Stanolind Oil & Gas Co.'s No. 2 W. R. Terrell, 431 ft. from N and 393 ft. from E line of lease, E. G. Sevier Sur. ..... Top sand 3,603 ft.; T. D. 3,603 ft.

Stanolind Oil & Gas Co.'s No. 1 Beal, 300 ft. from the S and W lines of the lease, W. P. Chisum Sur. ..... Rig up.

Stanolind Oil & Gas Co.'s No. 1 J. S. Powers, 330 ft. from the N and E lines of the John Womack Sur. ..... Drlg. 3,635 ft.

Stroube and Stroube's No. 1 Lilly Morse, 300 ft. W from East Texas Loan & Investment's No. 1 Lilly Morse, Robert W. Smith Sur. ..... Set 6⅝-in. csg.; T. D. 3,577 ft.

Texas Pacific Coal & Oil Co.'s No. 1 C. O. Christian, 330 ft. out of NW cor. of lease, Meredith McCabe Sur. ..... Spudding.

Weaver-Crim Corp.'s No. 1 Dave Ladd, 150 ft. from the S and W lines of tract, N offset to Woodley's No. 1 Ladd, Henry Robson Sur. ..... Testing 3,665 ft.

JOINER POOL—RUSK COUNTY

Arkansas Fuel Oil Co.'s No. 1 John Whelis, 200 ft. from N and E lines of Whelis tract in R. H. Pinney Sur. ..... Drlg. 2,451 ft.

Alford et al's No. 1 W. L. Thrash, 1,103 ft. from N, 420 ft. from E of SE cor., B. Smith Sur. ..... Derrick.

Armstrong and Pitt's No. 1 Cooper, 2,150 ft. from W and 166 ft. from N of survey ..... Drlg. 1,550 ft.

Armstrong's No. 1 Alford, 151 ft. from S and 1,080 ft. from W of survey, T. J. Moore Sur. ..... Derrick.

Bass et al's No. 1 Alford, 1,760 ft. from E and 5,260 ft. from N of survey, F. Cordova Sur. ..... Rig up.

Beard and Hammon's No. 1 Keeling, 5,100 ft. from S and 1,250 ft. from E of survey, F. Cordova Sur. .... Drlg. 2,140 ft.

Big Indian Oil Co.'s No. 1 Deason, 360 ft. from E and 4,100 ft. from S of survey, M. J. Prue Sur. ..... Sidetracking.

Berry-Lewis' No. 1 Thompson, 291 ft. from N and 2,955 ft. from W of M. L. Thompson 129 acres, M. J. Prue Sur. ..... Shut down 1,320 ft.

Campbell Oil Co.'s No. 1 Compton, 600 ft. from N and W line of Simon Del Rio Sur., 1½ miles NW of Minden ..... Derrick.

Cochran and Smith's No. 1 J. P. Cansler, 150 ft. from S and 1,025 ft. from W of 38.5-ac. tract, E. Collard Sur. ..... Rig up.

Consolidated Oil Co.'s No. 3 Jobe, 4,500 ft. from W and 3,160 ft. from N of survey, Juan Ximenes Sur. ..... T. D. 3,685 ft.

Consolidated Oil Co.'s No. 4 Jobe, 5,025 ft. from W and 3,160 ft. from N of survey, Juan Ximenes Sur. ..... Swabbed dry through csg.

E. L. Chapman's No. 1 A. P. Finney, 150 ft. from W of E 20 acres of 102-ac. tract, Isaac G. Parker Sur. .... Shut down 3,606 ft. in sand.

Dan Dillon et al's No. 1 W. H. Frederick (Jake), 150 ft. from E, 150 ft. from S of 50-ac. tract, Juan Ximenes Sur. ..... Derrick.

Danciger's No. 1 Deason, 3,925 ft. from S and 650 ft. from W of survey, Juan Ximenes Sur. ..... Swabbed through tubing; dry.

Devonian Oil Co.'s No. 1 Milstead, 200 ft. from S and E lines of J. B. Milstead 90.4-ac. tract in R. H. Pinney Sur. ..... Drlg. 2,697 ft.

Elliott's No. 1 Alford, 445 ft. N and 194 ft. W of most westerly SW cor. of J. P. Maxwell 144-ac. tract, I. G. Parker Sur. ..... Drlg. 1,800 ft.

Elzy and Tauteaham's No. 1 Deason, 1,300 ft. from W and 3,700 ft. from S of survey, Juan Ximenes Sur. .. Shut down 2,310 ft.

Elzy Drlg. Co.'s No. 1 Frederick, 150 ft. from S and 603 ft. from W of Frederick 90-ac. tract, Juan Ximenes Sur. ..... Derrick.

Foster and Jefferies' No. 1 Giles, 1,000 ft. from N and 150 ft. from E lines of Giles 90 acres in M. J. Prue Sur. ..... Drlg. 3,602 ft.

Green Pine Oil Co.'s No. 1 E. A. Thrash, 150 ft. from S and E lines of Thrash tract in Juan Ximenes Sur. ..... Drlg. 2,820 ft.

Gulf Production Co.'s No. 1 T. B. Cashem, 330 ft. from S and E lines of 95-ac. tract in Henry B. Dance Sur. ..... Drlg. 3,100 ft.

Gulf Production Co.'s No. 1 O'Quin, 330 ft. from the N and E lines of 54-ac. tract in the George Berry Sur. ..... Drlg. 3,691 ft.

Gulf Production Co.'s No. 1 Keeling, 1,550 ft. from E and 3,950 ft. from S of survey, F. Cordova Sur. .... Waiting on csg.

Greely and Baker's No. 1 Thrash, 2,600 ft. from W and 1,850 ft. from N of survey, Juan Ximenes Sur. ..... Drlg. 2,200 ft.

Griffith's No. 1 J. F. Lowe, 800 varas E of W line and 200 varas S of N line of 268-ac. tract, William Williams Sur. ..... Drlg. 3,570 ft.

Gulf Production Co.'s No. 1 Cash, 6,600 ft. from S and 3,800 ft. from E of survey, F. Cordova Sur. ..... Set csg.; T. D. 3,718 ft.

Haynes et al's No. 1 T. R. M. Lee, 3,300 ft. from W and 5,000 ft. from S of survey, M. J. Prue Sur. ..... Drlg. 2,800 ft.

W. B. Hamilton's No. 1 Gambrell, 180 ft. from S and 180 ft. from W of tract, R. McAlnulty Sur. ..... Derrick.

W. M. Hobson's No. 1 Wilson, 335 ft. from N and 354 ft. from W lines of 31.2-ac. lease in M. J. Prue Sur. ..... Rig up.

Humble Oil Q Ref. Co.'s No. 1 M. L. Thompson, 6,150 ft. from E and 1,850 ft. from N of survey, M. J. Prue Sur. ..... Set 6⅝-in. csg.; T. D. 3,666 ft.

Humble Oil & Ref. Co.'s No. 1 Plowman, 163 ft. from S and 1,074 ft. E of NW cor. of M. L. Thompson 129.6-ac. tract, F. Cordova Sur. ..... Building derrick.

Kimbrough et al's No. 1 Weatherby, 300 ft. from N and 300 ft. from E. Robert Martin Sur. ..... Drlg. 3,460 ft.

Luling Oil & Gas Co.'s No. 1 Frederick, 4,300 ft. from W and 1,425 ft. from N of survey, Juan Ximenes Sur. ..... Swabbed dry; won't flow; shut down.

Leonard Petroleum Co.'s No. 1 Sanger Bros., 390 ft. from N and 350 ft. from W of survey, J. P. Meredith Sur. ..... Derrick.

Magnolia Petroleum Co.'s No. 2 Moore, 330 ft. S and 448 ft. E of NE cor. of J. Womack Sur., Jesse Ellington Sur. ..... Location.

Madden et al's No. 1 Mose Mayfield, 960 ft. from S and 160 ft. from W line of 154-ac. lease, Daniel Clark Sur. ..... Testing 3,734 ft.

Mass and Tucker's No. 1 Matthews, 3,244 ft. from N, 4,356 ft. from E. Dalines Cartimas Sur. ..... Shut down 3,120 ft.

G. B. Mitchell et al's No. 1 Ras Pool, 2,700 ft. from E and 4,276 ft. from N of survey, M. J. Prue Sur. ... Shut down 3,551 ft.

J. R. McMurray's No. 1 Blackwell, 365 ft. from S and 159 ft. from W of Blackwell 93-ac. tract, M. J. Prue Sur. ..... Set 6⅝-in. csg.; T. D. 3,665 ft.

National Drlg. Co.'s No. 1 Young, 585 ft. N and 158 ft. W of NW cor. of Lide-Rowe's 30-ac. lease, M. J. Prue Sur. ..... Set 6⅝-in. csg.

Nat Saddler's No. 1 Ed Sparks, 350 ft. from E, 150 ft. from S of survey, L. C. Riggs Sur. ..... Set 8-in. csg.; T. D. 1,367 ft.

Olsen Bros.' No. 1 W. P. Brett, 2,350 ft. from E and 975 ft. from N of survey, M. J. Prue Sur. ..... Coring 3,676 ft.

Pace et al's No. 1 Deason, 730 ft. from N and 152 ft. from W of Deason east 52-ac. tract, M. J. Prue Sur. ..... Drlg. 3,004 ft.

Pilot Oil Co.'s No. 1 J. E. Thrash, 205 ft. from N and 650 ft. from E of 62-ac. tract, F. Cordova Sur. ..... Drlg. 3,008 ft.

G. Pollard's No. 1 Young, 586 ft. S and 182 ft. W of NW cor. of Lide 30-ac. lease, M. J. Prue Sur. ..... Drlg. 2,340 ft.

Pharis and Sample's No. 1 Deason, 1,558 ft. E and 156 ft. S of SE cor. of H. Brooks tract in M. J. Prue Sur. ..... Shut down 3,050 ft.

Phillips Petroleum Co.'s No. 1 Alford, 3,700 ft. from W and 60 ft. from S of survey, I. G. Parker Sur. ... Swabbed, will not flow; shut down.

Phillips Petroleum Co.'s No. 1 Wilson, 142 ft. from E and 136 ft. from S of Phillips 51-ac. tract, M. J. Prue Sur. ..... Drlg. 2,900 ft.

W. G. Ray Drlg. Co.'s No. 1 Wilson, 335 ft. from S and 240 ft. from W of lease, Richard McAnulty Sur. ..... Skid 75 ft. south; crooked hole.

Rowe et al's No. 1 Maxwell, 355 ft. from E and 237 ft. from S of B. F. Maxwell 59-ac. tract, R. H. Pinney Sur. ..... Derrick.

Robertson Drlg. Co.'s No. 1 Deason, 3,400 ft. from S and 1,800 ft. from W of survey, Juan Ximenes Sur. ..... Coring 3,656 ft.

Rusk County Oil Co.'s No. 1 Robertson, 150 ft. from N along W line of George Guthrie Sur. from SE cor., 150 ft. W of E line of Robertson 20-ac. tract, R. H. Pinney Sur. ..... Drlg. 2,785 ft.

Southern Crude Oil Purchasing Co.'s No. 1 C. Smith, 330 ft. from S line and 150 ft. from E line of lease, William Killen Sur. ..... Rig up.

Stokes et al's No. 1 Mrs. M. M. Talley, 4,100 ft. from W and 1,050 ft. from N of survey ..... Moving in rig.

Sun Oil Co.'s No. 1 Horace Schuler, 3,850 ft. from W and 6,110 ft. from N of survey, J. B. De Cadena Sur. ..... Derrick.

Sun Oil Co.'s No. 1 S. A. Selman, 150 ft. from N and 150 ft. from E of 50-ac. tract, M. J. Prue Sur. .... Set 6-in. 3,660 ft.; T. D. 3,680 ft.

Shaw Oil Co.'s No. 1 Ras Pool, 1,630 ft. from N and 153 ft. from E of Pool tract, M. J. Prue Sur. ..... Set 6⅝-in. csg.; T. D. 3,681 ft.

Shaw Oil Co.'s No. 1 Taliaferro, 150 ft. from S and 642 ft. from W of Taliaferro 52-ac. tract, Juan Ximenes Sur. ..... Set 6⅝-in. csg.; T. D. 3,667 ft.

Sinclair Oil & Gas Co.'s No. 1 Wilson, 335 ft. from N and 354 ft. from E of lease, Richard McAnulty Sur. ..... Oil sand 3,648-50 ft.

Suttle's No. 2 Holland, 156 ft. from N and 152 ft. from W of Holland 41.7-ac. tract, M. J. Prue Sur. ..... Drlg. 1,325 ft.

Tidal Oil Co.'s No. 1 Joel Shaw, 1,620 ft. from W and 1,900 ft. from S of survey, E. Collard Sur. ..... Location.

Tidal Oil Co.'s No. 2 Irion, 6,300 ft. from W and 6,500 ft. from N of survey, M. J. Prue Sur. ..... Derrick.

Turman and Swift's No. 1 S. E. Sanders, 712 ft. S and 164 ft. E of NW cor. of 55.1-ac. tract, T. J. Martin Sur. ..... Preparing to test.

Vitek's No. 1 Jobe, 2,950 ft. from W and 3,260 ft. from N of survey, Juan Ximenes Sur. ..... Drlg. 3,500 ft.

SMITH COUNTY

Big Indian Oil Co.'s No. 1 Mills, 1,046 ft. E along S line of C. Mills 67.8-ac. farm, SW cor. of same and 710 ft. N at right angles to S line of 67.7 acres, J. Jordan Sur. ..... Drlg. 3,455 ft.

G. B. Bunte, trustee's No. 1 A. S. Jarvis, 150 ft. from S and 150 ft. from W of 267-ac. tract, Juan Vargus Sur. ..... Rig up.

Cotton Belt Oil Co.'s No. 1 C. S. Jackson, 500 ft. from N and 500 ft. from W of 39.88-ac. tract, Henry Mickleborough Sur. ..... Derrick.

Dumas' No. 1 Cooke, 1,558 ft. SE along center line of Highway No. 64 from point where S. S. Cooke 17.6-ac. tract W line intersects highway and 942 ft. at right angles to road, James Jordan Sur. ..... Drlg. 3,713 ft.

East Texas Ref. Co.'s No. 1 Tyinks, 200 ft. from E and 200 ft. from S of survey, I. Wilson Sur. ..... Coring 3,834 ft.

Hancock and McCarthery's No. 1 J. C. Cross, 200 ft. from E of road and 200 ft. N of S line of survey on a 13-ac. tract, Burbridge Sur. ..... Derrick.

Joiner et al's No. 1 W. W. Wright, 847.5 varas from E and 647 varas from S of NW Wright 225-ac. tract, Van Sickle Sur. ..... Reaming 3,422 ft.

Magnolia Petroleum Co.'s No. 1 Wright, 150 ft. from N and 150 ft. from W of J. R. Wright 87.9-ac. tract, Juan Vargus Sur. ..... Derrick.

Morrison's No. 1 I. Roy, 330 ft. N and E from SW cor. of 87-ac. tract in Henry Cools Sur. ..... Drlg. 1,345 ft.

Sinclair Oil & Gas Co.'s No. 1 Armond Wiley, 1,163 ft. from N and 3,140 ft. from W of 312.11-ac. lease, James Jordan Sur. ..... T. D. 3,892 ft.

Sinclair Oil & Gas Co.'s No. 1 Mayfield, 2,194 ft. from N and 3,625 ft. from W of 376-ac. Mayfield lease, James Jordan Sur. ..... Derrick.

E. L. Smith's No. 1 William Stone, 330 ft. from E and 150 ft. from S of survey, D. Campbell Sur. ..... Building derrick.

Sinclair Oil & Gas Co.'s No. 2 Mayfield, 855 varas from N and 758 varas from W of Mayfield 376.4-ac. tract, James Jordan Sur. ..... Coring 3,800-21 ft.

Sun Oil Co.'s No. 1 A. V. Rick, 205 ft. from N and 300 ft. from W of 99-ac. tract, Juan Vargus Sur. .. Rig up.

Sun Oil Co.'s No. 1 J. J. Denton, 250 ft. from the N and 288 ft. from E lines of 114.2-ac. tract in Juan Vargas Sur. ..... Drlg. 300 ft.

The Texas Company's No. 1 Blackwell, 330 ft. from S and 330 ft. from W of Blackwell 100-ac. lease, James Jordan Sur. ..... Sand 3,698-3,703 ft.; set csg.

Winona O. & G. Co.'s No. 1 Freeman, 150 ft. from S, W of 89-ac. tract in A. J. Legrone Sur., 4 miles SE of Winona ..... Shut down 3,681 ft.

Witherspoon Oil Co.'s No. 1 T. O. Wright, 150 ft. from NE cor. of Sinclair-Wilson lease, 1,340 ft. from W and 225 ft. N at right angles, Juan Vargas Sur. .... Sand 3,666-72 ft.; set 6-in. csg. 3,630 ft.

UPSHUR COUNTY

Arcadia Refining Co.'s No. 1 R. S. Johnson, 1,000 ft. from N and 1,000 ft. from E of survey, J. H. Mallory Sur. ..... Rig up.

Brennan and Wood's No. 1 Robertson, center of Robertson 41-ac. tract, Ira Stephenson Sur. ..... Shut down 3,602 ft.

Joe Burnham's No. 1 Lena Beck, 4,000 ft. from S and 1,200 ft. from W of survey, H. W. Augustine Sur. .. Moving in material.

J. W. Green's No. 1 J. W. Wooden, 200 ft. from E and 200 ft. S of survey, Isham Williams Sur. ..... Derrick.

E. R. Perkins et al's No. 1 Kay, 660 ft. from S and 660 ft. from W of survey, Thomas J. Elliott Sur. .... Shut down 200 ft.

Pure Oil Co.'s No. 2 A. D. Clark, 70 ft. N of S line and 120 ft. E of W line of lease, J. Walling Sur. ..... Location.

Pure Oil Co.'s No. 8 W. T. Jarman, 325 ft. S of N line and 250 ft. E of W line of lease in Nacogdoches County School Land ..... Location.

Pure Oil Co.'s No. 5 R. L. Wells, 220 ft. W of E line and 94 ft. S of N line of lease in Mund Gross Sur. ..... Location.

Pure Oil Co.'s No. 3 L. A. Smith, 707 ft. S of N line and 250 ft. W of E line of lease in John Walling Sur. ..... Location.

Steinberger and Schwab's No. 1 J. K. Edwards, 250 ft. from SE and 250 ft. from S of E 81 acres of 281-ac. tract, David Ferguson Sur. ..... Rig up.

VAN ZANDT COUNTY

J. C. Fare's No. 1 P. S. Hand, C of Hand's 50-ac. tract, William Shuman Sur. ..... Shut down 5,160 ft.

H. Helms et al's No. 1 Bogue, 647 ft. W and 155 ft. S of SE cor. of J. M. Brown 70-ac. in Marshall University Sur., SE of Van ..... Shut down 3,093 ft.

Humble Oil & Ref. Co.'s No. 1 L. A. Dowdle, 1,027 ft. N of S line and 150 ft. E of W line, William Daniel Sur. ..... Temp. abnd. 2,987 ft.

Humble Oil & Ref. Co.'s No. 1 York, 150 ft. from E and 175 ft. from S, William Daniel Sur. ..... Drlg. 2,050 ft.

Imperator Oil Co.'s No. 2 G. W. Carter, 175 ft. from S and 35 ft. from W of G. W. Carter 171-ac. tract, William Daniel Sur. ..... Shut down.

Kelly Oil & Gas Co.'s No. 1 Lemsford, center of Lemsford tract, John Conner Sur. ..... Shut down 2,300 ft.

Neil McMehory's No. 1 R. V. Murphy, 150 ft. from N and 150 ft. W of survey, H. Bailey Sur. ..... Shut down 2,450 ft.

Pure Oil Co.'s No. 2 Shivers, 200 ft. S of N line and 200 ft. E of W line of lease, John Walling Sur. .... Location.

Pure Oil Co.'s No. 3 W. H. Cook, 200 ft. W of most easterly E line and 150 ft. from line running in NE and SW directions, Mund Gross Sur. ..... Coring 3,031 ft.
Pure Oil Co.'s No. 2 R. C. Crim, 250 ft. N of S line and 250 ft. W of E line of lease in Nacogdoches County School Land Sur. ..... Ready to swab in; T. D. 2,941 ft.
Pure Oil Co.'s No. 6 F. B. Smith, 250 ft. S of N line and 200 ft. W of E line of lease in John Walling Sur. ..... Cement setting 2,826 ft.
Pure Oil Co.'s No. 1 B. W. Russell, 650 ft. W of E line and 150 ft. S of N line of lease in David Rose Sur. ..... Cement setting 318 ft.
Roy Stumpff's No. 1 Riggs, 169 ft. from E and 155 ft. from S of 3-ac. tract, William Daniel Sur. ..... Derrick (rotary).
Van Oil Association's No. 1 Tankersley, 200 ft. from E and 1,000 ft. from S of farm, L. Landers Sur. ..... Shut down 1,028 ft.

WOOD COUNTY

Loche & Clark's No. 1 A. C. Pick, 165 ft. S of NE cor. G. C. Reeves 25-ac. tract, Daniel Fuller Sur. .... Shut down 997 ft.
Deep Rock Oil Co.'s No. 1 Maud Smith, center of Maud Smith S 40-ac. tract, L. Johnson Sur. ..... Moving in rig.
Vitek Oil Co.'s No. 1 Rosa Bogel, 250 ft. from N and 500 ft. from W of survey, Sarah English Sur. ..... Rig up.

WILDCAT OPERATIONS IN TEXAS PANHANDLE

(Continued from Page 49)

Jean Pet. Co.'s No. 1 Furneaux Bros., 330 ft. N and W, cor. SE, Sec. 200, Blk. B-2, H.&G.N. Sur. ..... S.D. 2,770 ft; P.B. 2,430 ft. and shot with 80 qts. 2,409-30 ft.
Magnolia Pet. Co.'s No. 1 Barrett, 330 ft. S and E, NE, Sec. 112, Blk. 3, I.&G.N. Sur. ..... S.O. 3,228 ft; S.D. 3,360 ft; P.B. to shoot.
Nelson et al's No. 1 Crews, 330 ft. S and E, NW, Sec. 12, Blk. 25, H.&G.N. Sur. ..... S.D. 2,619 ft.
Operators Royalty & Prod. Co.'s No. 2 Vanniman, 330 ft. S and W, E½ NE, Sec. 175, Blk. 3, I.&G.N. Sur. . Fishing; T.D. 2,915 ft.
Sanders et al's No. 1 Wright, 330 ft. S, 114 ft. E, Sec. 12, Blk. 3, I.&G.N. Sur. ..... S.D. 2,649 ft.
Skelly O. & G. Co.'s No. 1 Henston, 330 ft. N, 330 ft. E, Sec. 164, Blk. 3, I.&G.N. Sur. ..... S.D. 3,162 ft; show oil and gas.
Stanolind O. & G. Co.'s No. 2 Cobb, 330 ft. S and E, Sec. 165, Blk. 3, I.&G.N. Sur. ..... T.D. 3,272 ft; T.P. 3,254 ft; shot with 150 qts. 3,206-72 ft; C.O. and swbng.
Steckoll & Reigers' No. 1 Davidson, 660 ft. N and W, Sec. 64, Blk. B-2, H.&G.N. Sur. ..... Rig; moving in tools.
Sullivan & Ochiltree's No. 1-A Morse, 330 ft. S and W, N½ NE, Sec. 15, Blk. A-9, H.&G.N. Sur. ..... S.D. 2,636 ft.
Warner Oil Co.'s No. 1 Morse, 330 ft. S and W, N½ NW, Sec. 68, Blk. 25, H.&G.N. Sur. ..... Cellar.

HUTCHINSON COUNTY

Deal O. & G. Co.'s No. 2 Sanford, 330 ft. N and E of N 80 ac., S 160 ac., Sec. 81, Blk. 46, H.&T.C. Sur. .. S.D. 450 ft.
Huber Prod. Co.'s No. 1 Johnson Bros. (Premier), 330 ft. N and E of W 60 ac., N 80 ac., NW, Sec. 3, Blk. Y, A.&B. Sur. ..... Drlg. 2,410 ft; big gas 2,330 ft. and 2,395 ft.
Huber Pet. Co.'s No. 1 McIlroy, 330 ft. S, 330 ft. W, Sec. 28, Blk. Y, A.&B. Sur. ..... S.G. 2,280 ft; 3,000,000 ft. gas 2,-345 ft; drlg. 2,835 ft; gas at 2,-720 ft. and 2,750 ft.
Liner Drlg. Co.'s No. 1-D Johnson Bros., 330 ft. N and E, W½ SW, Sec. 6, Blk. 1, B.&B. Sur. ..... T.D. 2,916 ft; to U.R. 6-in. csg; 2,000,000 ft. gas 2,915 ft.
Liner et al's No. 1 Johnson Bros., 990 ft. S, 330 ft. E, W½ SE, Sec. 29, Blk. Y, A.&B. Sur. ..... Spudded and S.D.
Stanolind O. & G. Co.'s No. 2-A Pitcher, 990 ft. S, 330 ft. W, SE, Sec. 19, Blk. M-21, T.C.R.R. Sur. ..... T.D. 3,150 ft; P.B. 3,135 ft; side-tracked 8-in. csg; drlg. 2,410 ft; new hole.
Harry Steckel's No. 4 Whittenburg, 990 ft. N, 330 ft. E, NE, Sec. 39, Blk. Z, L.C.&S.F. Sur. ..... Drlg. 2,400 ft.
Skelly Oil Co.'s No. 1 Johnson Bros., 660 ft. S and W, SE, Sec. 30, Blk. Y, A.&B. Sur. ..... S.D. 3,115 ft.
The Texas Co.'s No. 1 Moore, 990 ft. N, 330 ft. W, SE, Sec. 21, Blk. M-21, T.-C. Ry. Sur. ..... C.O. 3,140 ft; T.D. 3,150 ft; shot with 50 qts. 3,110-50 ft.
Timms-Deatch's No. 4 Moore, 330 ft. N and W, Sec. 124, Blk. 4, I.&G.N. Sur. ..... Rig.

LIPSCOMB COUNTY

Okla. Public Service Co.'s No. 1 C. W. Jones, NE SW, Sec. 100, H.&T.C. Sur. ..... T.D. 2,003 ft.

LUBBOCK COUNTY

Center Oil Co.'s No. 1 Bowles Ranch..... Small S.O. 1,133-40 ft; S.D. 4,-167 ft.

MOORE COUNTY

Cloud & Dana's No. 1 Jones, 330 ft. N and E, SW, Sec. 169, Blk. 3-T, T.&N.O. Sur. ..... Trying to straighten hole; T.D. 3,220 ft; estimated 74,000,000 ft. gas.
Dana O. & G. Co.'s No. 1 R. Utey, 330 ft. S and W, NE, Sec. 135, Blk. 3, T.&N.O. Sur. ..... T.D. 3,526 ft; swbng. 12 bbls. per day with little gas; P.B. 3,-362 ft; running tubing.
Gulf Prod. Co.'s No. 2 Kilgore, C SE, Sec. 29, Blk. P.Mc., E.L.R.R. Sur. ..... Drlg. 3,145 ft; estimated 500,000 ft. gas.
Interstate's No. 1 Nield, C NE, Sec. 18, Blk. 44, H.&T. C. Sur. ..... Location.
Magnolia Pet. Co.'s No. 1 Jones, 330 ft. N, 330 ft. E, Sec. 170, Blk. 3-T, T.&N.O. Sur. ..... Rig.
Sunray Oil Co.'s No. 1 Rupert, 660 ft. N, 330 ft. E, NW, Sec. 191, Blk. 3-T, T.&N.O. Sur. ..... Cellar.
Plains Holding Co.'s No. 1 Bivina, 776 ft. S, 370 ft. E, S½ N½, Sec. 95, Blk. 46, H.&T.C.R.R. Sur. ..... S.G. 1,575 ft; drlg. 2,515 ft; estimated 15,000,000 ft. gas.
Plains Holding Co.'s No. 2 Bivina, 1,115 ft. S, 627 ft. E, Sec. 93, Blk. 46, H.&T.C. Sur. ..... Fishing 1,730 ft.
Sunray Oil Co.'s No. 2 Jones, 330 ft. N and W, W½ SW, Sec. 164, Blk. 3-T, T.&N.O. Sur. ..... Rig on ground.
The Texas Co.'s No. 1 Jester, C SW, Sec. 14, Blk. 6-T, T.&N.O. Sur. ..... Drlg. 2,385 ft; gas 2,296-2,300 ft.

MOTLEY COUNTY

Matador Oil Corp.'s No. 1 Owens, C NE, Sec. 10, Blk. G, B.&B. Sur. ..... S.D. 530 ft.

OLDHAM COUNTY

Amalgamated German-American Oil Corp.'s No. 1 Norton, 330 ft. S and E, Sec. 12, T.&N.O. Sur. ..... S.D. 400 ft.
Chambers et al's No. 1 Herring, CNL, Sec. 20, Blk. S, G.C.S.F. Sur. ..... S.D. 800 ft.

POTTER COUNTY

Canadian River Gas Co.'s No. 1-B Crawford..... 3,000,000 ft. gas 1,900-10 ft; drlg. 2,500 ft; estimated 9,000,000 ft. gas.

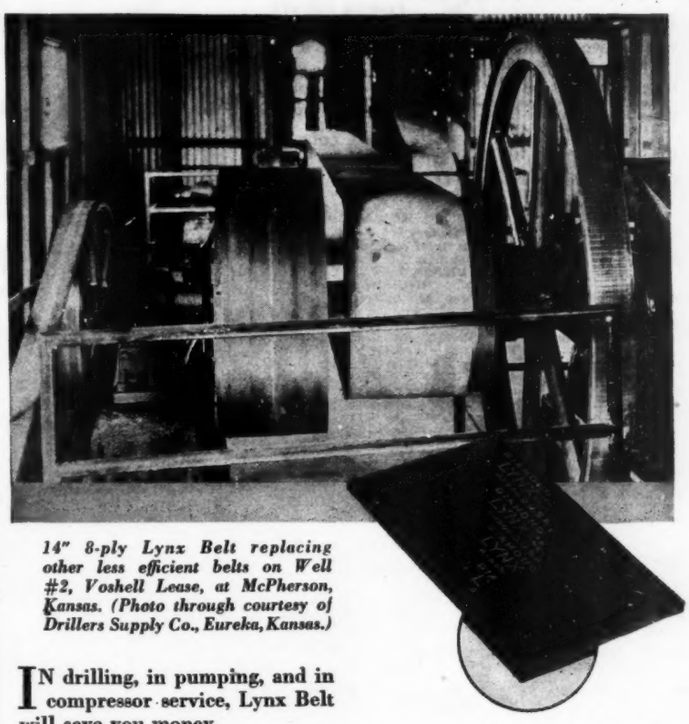
ROBERTS COUNTY

Ledrick-Clark et al's No. 1 Ledrick, 330 ft. N and W, Sec. 55, Blk. C, G.&M. Sur. ..... Rig.
Travis et al's No. 1 Cunningham, 330 ft. S and W, Sec. 74, Blk. M-2, H.&G.N. Sur. ..... Drlg. 1,200 ft.

WHEELER COUNTY

Clarity et al's No. 1 Porter, NW cor. SE, Sec. 2, Blk. A-9, H.&G.N. Sur. ..... Rig.
Vollmert's No. 1 Porter, 330 ft. S and E, NE, Sec. 15, Blk. 27, H.&G.N. Sur. ..... Rigged up and S.D.

THE BELT
WITHOUT A PEER
FOR PETROLEUM PRODUCERS AND REFINERS



14" 8-ply Lynx Belt replacing other less efficient belts on Well #2, Voshell Lease, at McPherson, Kansas. (Photo through courtesy of Drillers Supply Co., Eureka, Kansas.)

IN drilling, in pumping, and in compressor service, Lynx Belt will save you money.

The duck is different, the rubber is different, and the way it is put together is different, from other "best" belts.

This belt is thinner, and therefore more flexible, than a 32-oz. belt. It is stronger, and has less stretch, than a 36-oz. belt—so little stretch that it operates on compressor drives month after month without take-up.

The duck is so strong and compact that fastener trouble is eliminated. There is no seam on either side of the belt to open up and cause trouble. Air pockets cannot develop and cause the belt to bootleg, for any air that gets between the plies escapes at the laminated edge, without injury to the belt. The rubber friction is a triumph of rubber compounding. It stands up under the most exacting tests, both in the laboratory and in actual service.

If you have never tried this belt, you do not yet know what real belt service is—a strong statement, but justified by the facts. Pamphlet of detailed information on request. Our nearest branch has Lynx in stock for immediate shipment.

Lynx meets A. P. I. specifications.

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DIAMOND WELDING HOSE
DEFIANCE ASBESTOS SHEET PACKING

THE DIAMOND
RUBBER COMPANY, INC · AKRON, OHIO

WILDCAT OPERATIONS IN WEST TEXAS

(Continued from Page 49)

CULBERSON COUNTY

Cranfill Bros. and Sholts' No. 1 Seay, 2,310 ft. from S and W Sec. 45, Blk. 60, Public School Land ..... Shut down 2,270 ft.
Kornrumpf et al's No. 1 Garren, 330 ft. S and W Sec. 15, Blk. 79, Public School Land ..... Shut down 1,380 ft.

DAWSON COUNTY

Albaugh et al's No. 1 Robinson, C NW Sec. 46, Blk. M, E.L.&R.R. Sur. ..... Spudded 20 ft. and shut down.

ECTOR COUNTY

Galt, Brown & Penn's No. 1 Cowden, C SE Sec. 12, Blk. 44, Twp. 2s, T.&P. Sur. ..... Shut down 3,860 ft.
H. F. Wurts' No. 1 E. A. Ibbetson et al, 330 ft. from N and E lines of NW Sec. 16, Blk. 46, Twp. 3s, G. M. M. Br.&A. Sur. ..... Shut down 3,375 ft.

EL PASO COUNTY

Lane-The Texas Company's No. 1 Malone, 2,110 ft. from SW and NW of Sec. 46, J. M. Day Sur. ..... Shut down 3,089 ft.
Tri-State Oil Co.'s No. 1 Bobadella, 1,325 ft. from S and E lines Sur. 254, S.F. No. 7,247 ..... Fishing 615 ft.

FISHER COUNTY

Stanolind Oil & Gas Co.'s No. 2 Steele, 1,200 ft. E and 330 ft. N of SW cor. Sec. 210, B.B.B.&C. Sur. ..... Top lime 1,600 ft.; drlg. 3,010 ft.
The Texas Company's No. 1 Jean, 380 ft. from E and 400 ft. S of Sec. 201, Blk. 1, B.B.B.&C. Sur. ..... Drlg. 705 ft.

GAINES COUNTY

Landreth Prod. Co.'s No. 1 Alley, 660 ft. from N and W of Sec. Blk A-30, P.S.L. Sur. ..... Drlg. 205 ft.
Texas Consolidated Oil Co. et al's No. 1 Jones, 2,310 ft. from NE Sec. 4, Blk. A-8, P.S.L. Sur. ..... Shut down 3,435 ft.

GARZA COUNTY

Pandem Oil Corp.'s No. 1 Justice, 330 ft. from S and W of Sec. 12, Blk. 4, H.&G.N. Sur. ..... Spudded and shut down.
Perry & Posey's No. 1 Justice, 1,980 ft. from S and 1,650 ft. from E of Sec. 25, Blk. 6, H.&G.N. Sur. (3,500-ft. cable tool test) ..... Shut down 2,630 ft.

HOWARD COUNTY

Continental Oil Co.'s No. 1 Brindley, 660 ft. from S and E of Sec. 18, Blk. 33, Twp. 1s, T.&P. Sur. ..... Drlg. 2,910 ft.
Green O. & R. Co.'s No. 1 Denman, 990 ft. from S and 2,310 ft. from W Sec. 14, Blk. 29, Twp. 1s, T.&P. Sur. .. Spudded and shut down.

HUDSPETH COUNTY

Patillo & Welch's No. 1 Briggs, 300 ft. from S and W Sec. 13, Blk. 72, Twp. 7, T.&P. Sur. ..... Drlg. 535 ft.
Thelson's No. 1 University, 3,050 ft. from S and 2,225 ft. from E of Sec. 17, Blk. E ..... Spudded 35 ft. and shut down.

IRION COUNTY

Central Oil Co.'s No. 2 Horney, 150 ft. from N and 1,320 ft. from E Sec. 2, Blk. 3, H.&T.C. Sur. ..... Shut down 1,473 ft.
Davis et al's No. 1 Suggs, 1,560 ft. from S and 925 ft. from W, Sec. 3,081, Blk. 28, H.&T.C. Sur. ..... Rig.
Dixie Oil Co.'s No. 1 Williams, 1,320 ft. from S and E of Sec. 1,196, T.T.R.R. Sur. ..... 300 ft. oil in hole from 4,155-63 ft.; top Pennsylvanian 4,875 ft.; drlg. 5,330 ft.
Fox's No. 1 Horney, 1,520 ft. from N and 1,525 ft. from W Sec. 2, Blk. 3, H.&T.C. Sur. ..... Drlg. 307 ft.
Straughn & Texannati Oil Co.'s No. 1 Tankersley, 150 ft. from S and 750 ft. from W of Sec. 4, Gonzales County School Land ..... Plugging back to 1,220 ft. to shoot; total depth 1,506 ft.

JONES COUNTY

Abers et al's No. 1 Burton, 150 ft. from S and 175 ft. from E of 43.4-acre tract in G. Martinez Sur. ..... Total depth 80 ft.; pulling 12½-in. casing; shot 20 qts. 2,546-66 ft.
Bond & Trout's No. 1 Williams, 330 ft. S and E of SW cor. of J. W. Martin Sur. A-1,308 in Sec. 12 ..... Shut down 2,581 ft.; pumped 4 bbls. and exhausted.
Hardly Able Oil Co.'s No. 1 Butter, 5,790 ft. from S and 330 ft. from E of W. Littlefield Sur. No. 282, Abst. 251 ..... Shut down 2,610 ft.
Young & McNeil's No. 1 L. R. Cade, 150 ft. from N and 450 ft. E of NW cor. of J. A. Williams 200-acre tract in Sec. 17, but in Sec. 12, Blk. 19, T.&P. Sur. ..... Drlg. 1,727 ft.

LOVING COUNTY

Eppenauer et al's No. 2 Allen, 2,310 ft. from NE and 330 ft. from NW Sec. 90, Blk. 1, W.&N.W. Sur. ..... Shut down 4,140 ft.
Ervin & Mahres' No. 1 Thrope, 2,310 ft. from E and 330 ft. from S Sec. 46, Blk. 53, T.&P. Sur. ..... Shut down 810 ft.
Ervin & Mahres' No. 1 Meyer, 990 ft. NE and 330 ft. SE of Sec. 3, Blk. 2, W.&N.W. Sur. ..... Location.
Falbre & Evans' No. 1 Dean, 330 ft. from NE and 990 ft. from NW Sec. 79, Blk. 33, H.&T.C. Sur. ..... Drlg. 1,380 ft.
Hoffman et al's No. 1 Ramsey et al, 330 ft. NE and SE Sec. 83, Blk. 1, W.&N.W. Sur. ..... Total depth 4,059 ft.; to drill plug.
Hoffman et al's No. 2 Ramsey et al, 2,310 ft. from NE and 330 ft. from SE Sec. 83 ..... Fishing 1,700 ft.
Irwin et al's No. 1 Auld, 1,325 ft. from NE and 1,298 ft. from NW Sec. 67, Blk. 1, W.&N.W. Sur. ..... Rig up.
Lockhart & Co.'s No. 3 Bowen & Wells, 330 ft. from NE and SE of Sec. 92, Blk. 1, W.&N.W. Sur. ..... Shut down 4,050 ft.
Lockhart & Co.'s No. 2 fee, 676 ft. S, 330 ft. W Sec. 91, Blk. 1, W.&N.W. Sur. ..... Rigged up and shut down.
Lockhart's No. 1 Bell, 1,721 ft. from NE and 410 ft. from SE Sec. 91, Blk. 1, W.&N.W. Sur. ..... Drlg. 3,345 ft.
Lockhart & Co.'s No. 2 Hubbard, 1,650 ft. from NE line, 330 ft. NW line of Sec. 33, H.&T.C. Sur. ..... Rigged up and shut down.
Martin et al's No. 1 Johnson, 1,330 ft. from NW and 330 ft. from SW Sec. 86, Blk. 1, W.&N.W. Sur. ..... Location.
Richmond Drlg. Co.'s No. 1 Russell, 990 ft. from NE and 330 ft. from NW Sec. 80, Blk. 31, W.&N.W. Sur... Drlg. 2,925 ft.
Rush et al's No. 1 Wheat, 330 ft. from NW and SW Sec. 77, Blk. 1, W.&N.W. Sur. ..... Cellar.
Slagel Drlg. Co.'s No. 1 Cartwright et al, 2,310 ft. from S and 990 ft. from W Sec. 1, Blk. 57, Twp. 1, T.&P. Sur. ..... Total depth 3,182 ft.; plugged back to 3,174 ft.; testing water shutoff.
W. A. Suddreth et al's No. 1 Capitola Pool, 2,970 ft. from NE and 990 ft. from NW Sec. 73, Blk. 33, H.&T.C. Sur. ..... Shut down 1,315 ft.
Tennant et al's No. 1 Martin, 990 ft. from NW and SW Sec. 66, Blk. 1, W.&N.W. Sur. ..... Rig.
California Co.'s No. 3 Allen, 2,191 ft. from NW and 2,182 ft. from SW Sec. 90, Blk. 1, W.&N.W. Sur. .... Drlg. by tools 2,858 ft.
California Co.'s No. 4 Allen, 3,121 ft. from NW and 3,123 ft. from SW Sec. 90, Blk. 1 ..... Drlg. 1,360 ft.; top salt 855 ft.
West Texas Pet. Corp.'s No. 1 Salsbury, 330 ft. from NW and SW Sec. 89, Blk. 1, W.&N.W. Sur. ..... Top pay 4,380 ft.; shut down 4,400 ft.; to shoot.

MENARD COUNTY

Priest's No. 1 Sorrel, 1,000 ft. from E and 200 ft. from S cor. Sec. 132, E.L.R.R. Sur. ..... Shut down; total depth 2,665 ft.

PECOS COUNTY

Hagen et al's No. 1 Shearer, 660 ft. from SE and 660 ft. from SW Sec. 45, Blk. 10, H.&G.N. Sur. ..... Drlg. 1,125 ft.; top salt 1,035 ft.
Honolulu Oil Co.'s No. 1 Webb, 3,140 ft. from N and 1,000 ft. from W of Sec. 105, Blk. OW, G.S.&S.F. Sur... Rigging up.
McCurdy & Brown's No. 2 Tippett, 150 ft. from N and W of SE Sec. 46, Blk. 104, G.C.&S.F. Sur. ..... Location.
J. R. Miller et al's No. 1 Bennett, 359 ft. W of CWL Sec. 1, Blk. 119, G.C.&S.F. Sur. ..... Shut down 2,283 ft. for casing.
Penn Oil Co. et al's No. 1 Alvis, 2,358 ft. from S and 1,327 ft. from W Sec. 155, Blk. 3, T.&P. Sur. ..... Drlg. 3,470 ft.
Perren Oil Co.'s No. 2 Eaton, S of E Sec. 27, Blk. 3, H.&T.C. Sur. ..... Fishing 1,765 ft.
Pure Oil Co.'s No. 1 Harrison, 2,310 ft. from N and 330 ft. from W of Sec. 203, Blk. 3, T.&P. Sur. ..... Shut down 5,000 ft.
California Co. et al's No. 1 Thomas, 990 ft. from NW and SW Sec. 31, Blk. 34, H.&T.C. Sur. ..... Location.
Whitaker et al's No. 1 Mary Devlin, 150 ft. from N and 150 ft. from E Sec. 69, F. Hernandez Sur. ..... Shut down 430 ft.

REAGAN COUNTY

Big Lake Oil Co.'s No. 6-C University, 1,120 ft. S and 1,100 ft. from W Sec. 25, Blk. 9 ..... Location.

REEVES COUNTY

R. T. Hansford's No. 1 Williams, 150 ft. from S and W Sec. 17, Blk. 6, H.&G.N. Sur. ..... Shut down 580 ft.
Humble Oil & Ref. Co.'s No. 1 Bolmorhea Livestock Co., 1,320 ft. from N and 1,320 ft. from W Sec. 33, Blk. 5, H.&G.N. Sur. ..... Drlg. 330 ft.
Lee O. White et al's No. 1 Hershersor, 330 ft. from N and W lines of Sec. 5, Blk. 51, Twp. 10, T.&P. Sur.... Total depth 4,415 ft.; cleaning out.
California Co.'s No. 2 Kloh & Rumsey, 990 ft. from S and 1,520 ft. from E Sec. 11, Blk. 74, Twp. 4, T.&P. Sur. ..... Drlg. 3,225 ft.; top salt 3,675 ft.

RUNNELS COUNTY

Dutton et al's No. 1 Dean, 5,475 ft. from NE and 1,048 ft. from NW in J. Heil Sur. No. 419 ..... Shut down 2,335 ft.

SCHLEICHER COUNTY

Eastland Oil Co.'s No. 1 Joe Tisdale, C Sec. 29, Blk. M, G.H.&S.A. Sur. ..... Drlg. 2,317 ft.
Teas & Gant's No. 1 Allison, 1,320 ft. N and E of SW cor. Sec. 37, Blk. K, G.H.&S.A. Sur. ..... Shut down 5,006 ft.; contract depth.
Wesner et al's No. 1 Nicks, 2,310 ft. from N and 2,362 ft. from E of Sec. 77, Blk. LL, T.C. Sur. ..... Fishing 3,705 ft.
George Wilson's No. 1 Page, Sec. 40, Blk. L, 1,290 ft. from N, 1,670 ft. from W, G.H.&S.A. Sur. ..... Shut down 5,053 ft.

SCURRY COUNTY

G. E. Dickman and R. B. Pender et al's No. 1 F. C. Davis, 1,000 ft. N and 1,770 ft. W of SE cor. of Sec. 275, Blk. 2, H.&T.C. Sur. ..... Shut down 5,100 ft.
Scurry County Oil Exchange's No. 1 Earnest, 2,310 ft. from N and W Sec. 68, Blk. 3, H.&G.N. Sur. ..... Spudded and shut down.
Seifert & Dibble's No. 1 T. M. Blackburn, 2,310 ft. from N and 2,310 ft. from W line of Sec. 153, Blk. 97, H.&T.C. Sur. ..... Drlg. 3,305 ft.
Simon & Brock et al's No. 1 Cruse, 2,310 ft. from S and E Sec. 119, Blk. 97, H.&T.C. Sur. ..... Moving in material.

STERLING COUNTY

Beesley et al's No. 1 Foster, 2,940 ft. N and 300 ft. W of SW cor. Sec. 7, Blk. 22, H.&T.C. Sur., but in Sec. 16, Blk. 34, Twp. 4s, T.&P. Sur. ..... Drlg. 1,686 ft.

TAYLOR COUNTY

John B. Jameson's No. 1 Webb, 1,170 ft. S and W of NE cor. Sec. 46, Lunatic Asylum Land ..... Drlg. 6,387 ft.
Sanger et al's No. 1 City of Abilene, 330 ft. from S and 1,400 ft. from E of Sec. 66, Blind Asylum Land ..... Shut down 2,785 ft.

TERRELL COUNTY

Big Bend Oil Co.'s No. 1 Bassett, C NW Sec. 155, Blk. D, M.-K.-T. Sur. ..... Shut down 2,669 ft.
Keck Pecos Trust Co.'s No. 1 Hamilton, C Sec. 6, Georgetown Ry. Sur. ..... Shut down 3,150 ft.
Miller Bros.' No. 1 Allison & Burke, C NW cor. Sec. 10, Blk. 176, T.&P. Sur. ..... Shut down 120 ft.
Mid-Kansas Oil & Gas Co.'s No. 1 Goode, 2,152 ft. from E and 330 ft. from S Sec. 26, Blk. 161, G.C.&S.F. Sur... Shut down 6,120 ft.
Woodley & Jones' No. 1 Pankenham, C SE NW Sec. 43, Blk. B-2, C.C.S.D.&R.G.N.G. Sur. ..... Preparing to run 10-in. casing; total depth 1,075 ft.

TOM GREEN COUNTY

Belding & Dutton's No. 1 Norsworthy, 2,640 ft. from S and 587 ft. from E of John McNeese Sur. ..... Shut down 760 ft.; show oil and gas 725 ft.
Fitzgerald & Taliaferro's No. 1 Bennett, C SW Sec. 1,628, E. H. Dinger Sur. ..... Plugged back to 2,405 ft. to straighten hole; shut down 2,447 ft.
Mintex Oil Co.'s No. 1 Campbell Est., 446 ft. from S and 630 ft. from W of Sec. 180, Dist. No. 11, S.P. Sur. .... Shut down 1,994 ft.
Pratt & Hancock's No. 2 Lewis, 100 ft. N and 330 ft. E of most northerly SW cor. of Joshua S. Grant Sur. No. 2 ..... Shut down 200 ft.

UPTON COUNTY

Mintex Oil Co.'s No. 1 Lane, 2,310 ft. from N and 1,650 ft. from W Sec. 36, Blk. 1, M.-K.-T. Sur. ..... Top salt 738 ft.; drlg. 1,871 ft.

VAL VERDE COUNTY

Independent Operators' No. 1 Whitehead, SE SE Sec. 10, Blk. 4, I.&G.N. Sur., elev. 1,175 ft. ..... Shut down 5,420 ft.; to run 5 3/16-in. casing.
O. O. Owens' No. 1 Mills, Sec. 128, Blk. 1, I.&G.N. Sur., elev. 2,130 ft. ..... Shut down 6,780 ft.

WARD COUNTY

Bradford et al's No. 1 Carson, 990 ft. from NE and SE Sec. 26, Blk. 5, H.&T.C. Sur. ..... Drlg. 1,655 ft.
Bradford & Abell's No. 2 Boogher, 1,160 ft. from NW and 300 ft. from SW, Sec. 11, Blk. 5, H.&T.C. Sur.... Rigging up.
Beckley et al's No. 1 Johnson, 4,140 ft. from NE and 990 ft. from SE Sec. 8, Blk. 32, H.&T.C. Sur. ..... Drlg. 1,115 ft.; elevation 2,431 ft.
Buster Black's No. 1 Hall & Roberts, 990 ft. from NE and 1,650 ft. from NW Sec. 17, Blk. 34, H.&T.C. Sur... Drlg. 910 ft.
Clyde Bradford's No. 1 Hardimage and Welsor, 330 ft. from SE and 330 ft. from SW, H.&T.C. Sur. ..... 1,300 ft. fluid in hole, 75 per cent oil; drlg. 2,465 ft.; est. good for 100 bbls. per day.
Central Oil & Gas Co.'s No. 1 Barrow, 330 ft. from NW and 1,263 ft. from SW Sec. 55, J. W. Jackson Sur. ..... Spudded and shut down.
Gibson & Johnson's No. 1 Johnson, 4,140 ft. from SE and 990 ft. from NE Sec. 10, Blk. 32, H.&T.C. Sur..... Drlg. 1,125 ft.
Hankinson et al's No. 1 Emery, 3,090 ft. from SE and 510 ft. from SW Sec. 26, Blk. 5, H.&T.C. Sur. ..... Total depth 835 ft.; running 8¼-in. casing.
Magnolia Pet. Co.'s No.1 Sealy (Atlantic), 2,130 ft. from S and 1,650 ft. from E Sec. 45, Blk. F, G.M.M.B.&A. Sur. ..... Top salt 2,345 ft.; drlg. 2,935 ft.
R. F. Owens' No. 1 Johnson, 100 ft. from NE and 1,100 ft. from SE of Sec. 8, Blk. 33, H.&T.C. Sur. ..... Drlg. 4,470 ft.
Peck et al's No. 1 Merrett, 3,166 ft. from NE, and 2,648 ft. from SE Sec. 11, Blk. 5, H.&T.C. Sur. ..... Drlg. 1,520 ft.
Rector Oil Co.'s No. 1 Smith, 1,320 ft. from N and E Sec. 22, Blk. A, G.M.M.B.&A. Sur. ..... Moving in material.
Shipley et al's No. 5 Hayslett, 2,490 ft. from SE and 1,980 ft. from SW Sec. 17, Blk. 5, H.&T.C. Sur. ..... Shut down 2,520 ft.; 1,500 ft. oil in hole; waiting on tubing.
Simms Oil Co.'s No. 1 Himmel, 330 ft. from NE and 2,310 ft. from SE Sec. 30, Blk. B-29, P.S.L. Sur. ..... Drlg. 1,090 ft.; top salt 965 ft.
Sturm's No. 1 Jones, 330 ft. from SW and SE of Sec. 25, Blk. B-29, P.S.L. Sur. ..... Drlg. 865 ft.; elev. 2,519 ft.
California Co. et al's No. 1 Lanham, 990 ft. from NE and SE Sec. 35, Blk. 34, H.&T.C. Sur. ..... Building rig.
California Co.'s No. 1 Gordon, 330 ft. from NE and SE Sec. 6, Blk. 34, H.&T.C. Sur. ..... Top pay 2,352 ft.; total depth 2,599 ft.; flowed 91 bbls. in 2 hrs.
Shipley et al's No. 1 Monroe, 330 ft. SE SW Sec. 3, Blk. 1 ..... Shut down 3,825 ft.

WINKLER COUNTY

White et al's No. 1 Owenby, 305 ft. from NE and 1,185 ft. from SE Sec. 7, Blk. 32, H.&T.C. Sur. ..... Shut down 200 ft.
Liner Drlg. Co.'s No. 1 Campbell, 350 ft. from N and E cor. Sec. 2, Blk. B-5 ..... Shut down 4,640 ft.

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LOUISIANA-ARKANSAS PROVEN AREAS

(Continued from Page 38)

SABINE PARISH—ZWOLLE

W. M. Coats' No. 3 Sabine Lbr. Co., SW cor. SW NW, Sec. 1-7-13 ..... Flowing 50 bbls. 2,322 ft.
W. M. Coates' No. 4-A Sabine Lbr. Co., Sec. 1-7-11 ..... Location.
Hawkins et al's No. 1 Moran, Sec. 1-7-11 ..... Tested dry 2,493 ft; arranging to deepen.

O. A. Gautier et al's No. 1 Mischell, 330 ft. E, 150 ft. N, SW cor. SE NW, Sec. 30-8-12 ..... S.D. 1,360 ft.
Jordon Drlg Co.'s No. 2 La. Long Leaf Lbr. Co., Sec. 3-7-11 ..... Rig up.
Lyons & Neely's No. 1 Baird Co., Sec. 1-7-11 ..... 1,200 bbls. at 2,456 ft.
H. H. Alvord, Jr.'s No. 1 Sabine Lbr. Co., 200 ft. S, 175 ft. W, NE cor. SE NW, Sec. 11-7-12 ..... Set 6-in. 2,302 ft.
Ohio Oil Co.'s No. 8 Bowman-Hicks, 330 ft. N, 330 ft. E, NW cor. NE, Sec. 2-7-12 ..... Drlg. hard chalk 2,440 ft.
Pelican Nat. Gas Co.'s No. 9 La. Long Leaf Lbr. Co., 990 ft. W, 655 ft. N, SE cor. SW SE, Sec. 3-7-11 ..... Set 10-in. 85 ft; drlg. 1,500 ft.
Sabine Royalties Co., Inc.'s No. 1 Hill, 400 ft. S, 200 ft. E, NW cor. NE NE, Sec. 5-7-11 ..... W.O.S.R. 2,506 ft.
Sabine Prod. Co.'s No. 2 Pearce, 858 ft. N, 530 ft. W, SE cor. SE NW, Sec. 10-7-11 ..... Derrick.
Eddie Self's No. 1 Jacobs, Sec. 1-7-11 ..... Derrick.
The Texas Co.'s No. 3 Stille, 330 ft. S, 333 ft. E, NW cor. SW, Sec. 33-8-11 ..... Set 6⅝-in. 2,230 ft.
The Texas Co.'s No. 1 DeLatia et al, 1,070 ft. W, 990 ft. N, SE cor., Sec. 3-7-11 ..... Derrick.
Houston-Sabine Prod. Co.'s No. 1 Sabine Lbr. Co. (was Triangle Pet. Co.'s No. 3 Sabine Lbr. Co.), 330 ft. N and E, SW cor., Sec. 36-8-12 ..... Began May 2; set 10-in. 85 ft; drlg. 500 ft.
J. C. Walton's No. 1 Sabine Lbr. Co., 300 ft. S, 300 ft. W, NE cor. NW, Sec. 11-7-12 ..... Tested 2,276 ft; S.O; W.O.

WEBSTER PARISH—SAREPTA

Cassidy & Davis' No. 1 Nickerson, 300 ft. S, 300 ft. W, NE cor. SW, Sec. 29-23-10 ..... S.D. 150 ft

ARKANSAS

OUACHITA COUNTY—STEPHENS

Wesson & Bonner's No. 1 Wesson, 500 ft. W, 175 ft. N, SE cor. SW NW, Sec. 22-15-19 ..... Trying to shut off wtr. flow.

UNION COUNTY—EL DORADO

Lion O. & R. Co.'s No. 9-A G. P. Hayes, 242 ft. S, 246 ft. W, NE cor. Lot 5, NE, Sec. 4-16-15 ..... Drlg. volcanic ash 2,932 ft.
Rice Drlg. Co.'s No. 1 Watley, 150 ft. S, 150 ft. E, NW cor. SW, Sec. 7-17-15 ..... S.D. funds; T.D. 2,186 ft.
Southern Prod. Co.'s No. 1 Wingfield, NE cor. SE NW, Sec. 16-19-15 ..... S.D. 2,608 ft.

UNION COUNTY—URBANA

Marine Oil Co.'s No. 1 Winn est., 330 ft. S and E, NE cor. S½ NW, Sec. 11-18-13 ..... Began Apr. 21; set 10-in. 276 ft; drlg. 2,125 ft.
Marine Oil Co.'s No. 1 Union Sawmill Co., 330 ft. N and E, SW cor. SE SE, Sec. 3-18-13 ..... Began May 1; set 10-in. 236 ft; drlg. 900 ft.
Marine Oil Co.'s No. 2-E Thompson, 330 ft. N, 330 ft. E, SW cor. NE NE, Sec. 10-18-13 ..... Location.

EAST TEXAS

HARRISON COUNTY

Calatex O. & G. Co.'s No. 6 Argus, 755 ft. N, 699 ft. W, Mile Post 27, in J. Womack Sur. ..... Location.

PANOLA COUNTY

Daisy O. & G. Co.'s No. 1 Rucks, John Palmer Sur. .... S.D. 2,600 ft.
Dillon & Bradham's (was W. G. Banks et al's) No. 1 C. O. Baldwin, 1,395 ft. W, 1,362 ft. S, NE cor. Baldwin 200 ac. in Hampton West Sur. ..... S.D. 1,555 ft.
S. E. Bell et al's No. 1 Burnett Lbr. Co., C. S. B. Hendricks Sur. ..... S.D; W.O. 3,335 ft.
C. D. Neff et al's No. 6 Brumble, B. C. Jordan Sur. .... Derrick.
United Prod. Corp.'s No. 17 Steele, 1,320 ft. N, 660 ft. W, SE cor. C. D. Steele lease, in B. C. Jordan Sur. .. Location.
United Prod. Corp.'s No. 10 Warner, 388 ft. N, 2,467 ft. W, SW cor. Thos. Cox Sur. in Ben Jordon Sur. .... Set 12½-in. 370 ft; drlg. 1,485 ft.
Southwestern O. & G. Co.'s No. 1 E. R. Vinson, 3005 ft. S, 1,001 ft. W, NE cor. C. T. Anderson Sur. ..... Drlg. 2,635 ft.

MISSISSIPPI

HINDS COUNTY

Cleve Love et al's No. 2 Ridgeway-McGhee, SE cor. NW, Sec. 2-5-1e ..... Derrick.
Pirtle & Flint's No. 1 Payne, 450 ft. W, 50 ft. N, SE cor. SW SW, Sec. 27-6-1e ..... Dry and abd. 2,567 ft.

RANKIN COUNTY

Miss. G. & F. Co.'s No. 1 Hanna, SW cor. SW NE, Sec. 14-5-1e ..... Derrick.

WILDCAT OPERATIONS IN LOUISIANA-ARKANSAS

(Continued from Page 38)

Keatchie O. & G. Co.'s No. 1 Hallie Smith (was H. E. Weichert's), NE SE, Sec. 31-14-15 ..... S.D. 2,350 ft.
C. D. Neff et al's No. 1 Ramsey, 1,000 ft. W, 400 ft. S, NE cor. SE, Sec. 33-13-16 ..... S.D; W.O; bit in hole 3,000 ft.
Ben Merritt tr.'s No. 1 Walluma, NE cor. SW SW, Sec. 29-12-13 ..... Drlg. 1,030 ft.
E. T. Oakes' No. 1 R. H. Bryant et al, 200 ft. N and W, SE cor. NE NW, Sec. 30-13-15 ..... Rigging up.

NATCHITOCHES PARISH

W. M. Coats' No. 1 Collins, 730 ft. N, 50 ft. E, C, Sec. 28-9-10 ..... T.A. 4,091 ft.
J. W. Cooper et al's No. 1 Cooper, NW SW, Sec. 35-11-10.. S.D. 3,156 ft.
Cooper et al's No. 2-A Cooper, C SE SE, Sec. 32-11-10.. S.D. 1,518 ft.
C. M. Talley et al's No. 1 C. M. Talley, 1,980 ft. W, 660 ft. S, NE cor. SE, Sec. 29-11-10 ..... Tested dry; S.D. 1,380 ft.

RED RIVER PARISH

La. Oil & Dev. Co.'s No. 2 La. Delta Pecan Co., 2,950 ft. S, 300 ft. E, NW cor., Sec. 27-13-11 ..... Spudded in; S.D. 50 ft.
Lucky Strike Oil Co.'s No. 1 Chaffraix, 200 ft. S, 200 ft. E, C, Sec. 32-12-10 ..... T.A. 3,010 ft.

RICHLAND PARISH

Alto Gas Co.'s No. 2 Hunt, 660 ft. S and E, NW cor., Sec. 13-17-5 ..... Derrick.
Southern Carbon Co.'s No. 1 Rosengraut & Ducomb, 1,-000 ft. E, 660 ft. S, NW cor., Sec. 24-17-5 ..... Completed Apr. 29; 24,144,000 ft. gas 2,430 ft.
Southern Carbon Co.'s No. 2 Rosengraut & Ducomb, 1,-980 ft. N, 660 ft. E, SW cor., Sec. 19-17-6 ..... Rigging up.
Southern Carbon Co.'s No. 3 Rosengraut & Ducomb, 660 ft. S and E, NW cor., Sec. 30-17-6 ..... Location.
Southern Carbon Co.'s No. 1-B C. M. Noble, 2,966 ft. N, 1,525 ft. W, cor. Secs. 7, 8, 17 and 18, in Sec. 37-15-6.. Location.
United Gas Public Service Corp.'s No. 4 Earle, SE cor., Sec. 1-16-5e ..... Coring 2,511 ft.

SABINE PARISH

Durham Oil Co.'s No. 1 Polly (was Davis et al's), NE cor. NE NE, Sec. 18-8-12 (was Stacy et al's) ..... S.D. 2,722 ft.
Diffie & Barnett's No. 1 Lites (was J. W. Clark's), 330 ft. N, 330 ft. W, SE cor. SW NW, Sec. 34-8-11..... S.D. 105 ft.
R. L. Gay, tr.'s No. 1-A Long Bell Lbr. Co., 430 ft. S, 300 ft. W, NE cor. NW NW, Sec. 10-8-13 ..... Drlg. chalk rock 2,300 ft.
Lacey Prod. Co.'s No. 1 Cooper, 330 ft. N, 330 ft. W, SE cor. SW NW, Sec. 30-8-11 ..... W.O.S.R; T.D. 2,630 ft.
Lide et al's No. 1 Ponder, 990 ft. N, 990 ft. W, C, Sec. 15-7-11 ..... Completed May 4; 3 bbls. 2,800 ft.
Lide et al's No. 2 Ponder, 300 ft. S, 300 ft. E, NW cor. NE NW, Sec. 15-7-11 ..... S.D. 2,520 ft.
Jean Longoria's No. 1 Belton (no check), Sec. 31-9-13.... S.D. 1,400 ft.
H. W. Perritt's No. 4 Bowman-Hicks, SE cor. SE NE, Sec. 2-7-12 ..... Location.
H. W. Perritt's No. 1 Boring, NW cor. NW NW, Sec. 11-7-12 ..... Drlg. 2,518 ft.
Sabine Royalties Co.'s No. 1 Skinner, SW NW, Sec. 5-8-11. Began May 2; set 10-in. 65 ft. drlg. 620 ft.
Stovall Drlg. Co.'s No. 1 Nulton, SE cor. NW NE, Sec. 1-7-13 ..... Rig up.
A. H. Thames' No. 1 Edward est., 150 ft. NW SE cor. NE SE, Sec. 8-8-13 ..... S.D. for water 1,200 ft.
John Woodley's No. 1 Sabine Lbr. Co., 400 ft. S, 330 ft. W, NE cor. SE, Sec. 12-8-12 ..... Drlg. plug 2,310 ft.

TENSAS PARISH

A. R. Willis et al's No. 1 Currey, 1,320 ft. S, 1,320 ft. E, NW cor., Sec. 39-11-12 ..... Fishing for D.S. 2,475 ft.

UNION PARISH

Fred A. Green's No. 1 U. S. Govt., 660 ft. N, 1,980 ft. W, SE cor. NE, Sec. 26-20-3e ..... Completed May 2; 7,020,000 ft. gas 2,166 ft.
Nemours Corp.'s No. 1 Pace-Hamby, 660 ft. NE of SW cor., Sec. 35-22-3e ..... 2,218,000 ft. gas 2,188 ft.
Nemours Corp.'s No. 1 McGaugh, 770 ft. N, 651 ft. E, SW NW, Sec. 24-22-3 ..... Began May 2; set 12-in. 147 ft.

WEBSTER PARISH

Coyle tr.'s No. 1 Frazer, 200 ft. N, 200 ft. E, SW cor. NE SE, Sec. 27-23-11 ..... Derrick.
Red Hawk Oil Co.'s No. 1 Mathews, 330 ft. N, 330 ft. E, C, Sec. 11-23-9 ..... Bailed small S.O. to 2,406 ft; csg. collapsed; T.D. 2,797 ft.

WEST CARROLL PARISH

United Gas Public Service Co.'s No. 1 Pioneer Cooperage, 663 ft. E, 3,954 ft. S, NW cor., Sec. 29-21-9..... Set 10-in. 867 ft.

ARKANSAS

CHICOT COUNTY

R. R. Smith's No. 1 Lytle, 660 ft. N, 660 ft. E, C, Sec. 21-18-3 ..... T.A. 2,925 ft.

COLUMBIA COUNTY

Kendall Oil Co.'s No. 1 Fullenwelder, Rhea & Kitchen, Sec. 13-17-22 ..... Set 12½-in. 75 ft; drlg. 778 ft.

CLAY COUNTY

E. C. Jeffus' No. 1 Underwood, 510 ft. N, 350 ft. W, C NW SE, Sec. 4-20-3 ..... S.D; clearing titles 1,214 ft.

CLEBURNE COUNTY
(Cable tools)

Donnelly-Craver et al's No. 1 Donophan Lbr. Co., SE cor. NW, Sec. 33-11-9 ..... S.D. 3,740 ft.

DALLAS COUNTY

B. C. Brewer's No. 1 W. E. Hillman, 330 ft. E, 40 ft. S, NW cor. SE NE, Sec. 20-10-13 ..... S.D; W.O. 2,846 ft.
J. H. James tr.'s No. 1 Fordyce Lbr. Co., 200 ft. S, 200 ft. E, NW cor. NW NE, Sec. 11-9-15 ..... Coring hard sand 2,514 ft.

GARLAND COUNTY
(Cable tools)

Givins et al's No. 1 Garrett, 660 ft. S, 660 ft. W, C, Sec. 1-3-19 ..... 1,300 ft. 5 3/16-in. in hole T.A. 1,-756 ft.

GRANT COUNTY

Spann & McClung's No. 1 Sarah Page, 660 ft. W, 660 ft. S, NE cor. NW, Sec. 3-3-12 ..... S.D; W.O; soft sand 1,024 ft.

HOT SPRINGS COUNTY

John Watkins' No. 1 Cunningham (was J. R. Lockhart's), 385 ft. S, 385 ft. W, NE cor., Sec. 11-5-16.... S.D. for funds 220 ft.

LAFAYETTE COUNTY

McIver et al's No. 1 Hattie, NW cor. NE, Sec. 1-20-6.... T.A.
Smitherman & McDonald's No. 1 Reed, 200 ft. N, 200 ft. W, SE cor, NW NW, Sec. 16-15-22 ..... Abd. 1,198 ft.
Smitherman & McDonald's No. 1 Rogers, 330 ft. N and E, SW cor. NW SE, Sec. 17-15-22 ..... Rig up.

LINCOLN COUNTY

Lawrence Cook, tr.'s No. 1 McGhee Planting Co., 420 ft. S, 220 ft. W, NE cor. NE SW, Sec. 5-8-7 ..... Set 12½-in. 90 ft; drlg. 320 ft.

LITTLE RIVER COUNTY

Roberts Oil Co.'s No. 1 H. J. Russell, 330 ft. E, 330 ft. S, NW cor., Sec. 25-12-29 ..... Location.

LOGAN COUNTY

J. H. Flowers' No. 1 J. H. White, Sec. 13-6-26 ..... S.D; W.O. 3,570 ft.

MILLER COUNTY

Bullock Oil Co.'s No. 1 Hervey, SE NE, Sec. 33-14-26.... Abd. 2,813 ft.
East Texas O. & G. Co.'s No. 1 Harvey, 500 ft. E, 300 ft. S, NW cor., Sec. 2-15-26 ..... T.A. 910 ft.
E. & F. Oil Co.'s No. 1 E. L. Beck, 200 ft. S, 200 ft. E, NW cor. SW, Sec. 36-15-26 ..... T.A. 2,968 ft.
Fitzwater et al's No. 1 Beck, 200 ft. N, 200 ft. W, SE cor. SW SE, Sec. 33-15-26 ..... T.A. 93 ft.
Gusher Bend Oil Co.'s No. 1 Adams, 120 ft. S, 800 ft. W, NE cor. NW, Sec. 26-14-26 ..... Abd. 2,635 ft.
J. D. McRae's No. 1 Smith, 150 ft. N, 150 ft. W, SE cor., Sec. 28-15-26 ..... Derrick.

OUACHITA COUNTY

Copenhaven et al's No. 1 Elliott, Sec. 11-15-17 ..... Bailed dry 2,210 ft; S.D; W.O.
Boling & McLeon's No. 1 L. D. Nealy, 150 ft. S, 150 ft. W, NE cor. SE SW, Sec. 25-16-15 ..... Location.

PIKE COUNTY

E. R. Henderson's No. 1 Tilyou, 660 ft. W, 500 ft. S, NE cor. NE SE, Sec. 26-8-14 ..... T.A. 2,940 ft.
E. R. Henderson's No. 1 J. L. Lee, 400 ft. S, 350 ft. E, NW cor. SW SE, Sec. 31-8-24 ..... Rig up.

POPE COUNTY

Ark.-La. P. L. Co.'s No. 1 Baird, 760 ft. S, 660 ft. E, NW cor., Sec. 11-7-20 ..... Drlg. hard sand 4,024 ft.
Ark.-La. P. L. Co.'s No. 2 McFaddin, 685 ft. N, 485 ft. W, SE cor. NE SW, Sec. 15-9-21 ..... Drlg. black sand 4,368 ft.

SCOTT COUNTY

Heavener O. & G. Co.'s No. 1 Riser, Sec. 36-4-26..... Fishing for bit; cor. T.D. 1,486 ft.
Waldron O. & G. Co.'s No. 1 White, NE cor. SW NW, Sec. 17-3n-29 ..... S.D; waiting on csg. 1,860 ft.

UNION COUNTY

Chapman & Wilson's No. 1 A. H. Hadley, 330 ft. N, 330 ft. E, SW cor. NE SW, Sec. 2-18-13 ..... 600 ft. fluid 30% S.W. in hole; T.A. 3,570 ft.
Wilson & Chapman's No. 1 N. Parker, 330 ft. S and W, NE cor. NE SE ..... Coring shale 3,200 ft.

VAN BUREN COUNTY

Glenn Kohle et al's No. 1 Scalan, 200 ft. S, 200 ft. W, NE cor. SE NW, Sec. 5-19-13 ..... T.A. 50 ft.

WASHINGTON COUNTY
(Cable tools)

C. H. Willoughby's No. 1 Jones, Sec. 34-16-30..... S.D. for funds 1,795 ft.
H. H. Taylor et al's No. 1 Runny, C NE SW, Sec. 1-13-29. S.D. 1,700 ft.

YELL COUNTY
(Cable tools)

Tegmeier & Luckett's No. 1 Falcon, Sec. 36-7-21..... S.D. 5,710 ft.

EAST TEXAS

BOWIE COUNTY

Devore & Midfield's No. 1 Roy B. Cooper, 200 ft. S, 200 ft. W of NE cor. R. B. Cooper 115-ac. tr., Wm. Ward Sur. ..... Drlg. 1,600 ft.
Hindeman & Ball's No. 1 Merritt (was Maud-Redwater Oil Co.'s), 175 ft. N, 175 ft. E, SE cor. G. W. Hardidge 100-ac. tr. on Floyd Merritt tr. in Y. S. McKinney Sur. ..... Drlg. hard chalk 2,300 ft.
Tarkington & Jones' No. 1 W. W. Whybark, 200 ft. S, 200 ft. W of SW cor. J. H. Dyer Sur. ..... Derrick.
Lee Timberlake et al's No. 3 Tidwell, 1,510 ft. N, 688 ft. W, SE cor. T. M. Rice Sur. ..... Tested S.W. 2,930 ft; arranging to deepen.

CAMP COUNTY

McDonald Bros.' No. 1 Tillery, 150 ft. E, 450 ft. S, NW cor. 127-ac. tr. in J. H. Murphy Sur. ..... S.D. 3,600 ft.

CASS COUNTY

E. K. Atkinson's No. 1 T. J. Wilson, 1,988 ft. S of N line, 2,376 ft. E of W line of H.R.S., J. R. McFarland Sur. ..... Derrick.

R. G. Baker's No. 1 W. R. Caver, on W. R. Caver 75-ac. tr., John Lick Sur. ..... Rigging up.

Davis & Pigg's No. 1 Roy Brian, SW cor. Roy Bryan 88-ac. tr., Albert H. Latimer Sur. ..... S.D. 1,975 ft.

Geo. McKamie's No. 1 R. E. Hall, 150 ft. N, 150 ft. W, SE cor. Hall's 117-ac. tr., H. Buckler Sur. ..... Set 12½-in. 165 ft; arranging to resume drlg.

C. E. Murdock's No. 1 First National Bank, Evans Watson Sur. ..... Coring shale 3,640 ft.

Olds & Smith's No. 1 Atheny, 3,056 ft. W-E line, 856 ft. S-N line, J. C. Byers Sur. ..... Drlg. 1,595 ft.

John C. Rogers' No. 1 I. E. Lanier, 575 ft. N, 879 ft. W, SE cor. Lanier 86 ac. in K. E. Welborn Sur. ..... S.D. 2,375 ft.

John C. Rogers et al's No. 1 W. Q. Henderson, 3,100 ft. S, 3,100 ft. E, NW cor., Wm. Davis Sur. ..... S.D. 955 ft.

HARRISON COUNTY

Wm. H. Atkinson's No. 1 O. D. Hays, 900 ft. E, 150 ft. S, NW cor. O. D. Hays' 46-ac. tr., J. H. Chaffin Sur. .. Began May 4; set 10-in. 195 ft; drlg. 206 ft.

Elmore & Bonner's No. 1 J. C. Lowery, in center of J. C. Lowery 81-ac. tr., W. W. O. Stanfield Sur. ..... Cored sand; S.G. 2,304 ft.

Everett Prod. Co.'s No. 1 R. L. Gypert, 1,320 ft. W of NE cor., 150 ft. N at right angles from NE cor. of E. M. Wilder Sur. in Richard Hooper Sur. ..... Rigging up.

Gholson et al's No. 1 Bivins Farm Co., on J. K. Bivins, Jr.'s 320-ac. tr., Thos. Toby Sur. ..... Rigging up.

O. O. Olford et al's No. 1 R. W. Bolding, 330 ft. E of SE cor. J. B. Cullen's 161-ac. tr., 300 ft. N of N line of Mrs. C. L. Brown's 20-ac. tr., W. W. O. Stanfield Sur. ..... Began May 3; set 10-in. 198 ft.

Geo. L. Pace et al's No. 1 T. G. and Eugene Barker, 710 ft. N of S line, 1,930 ft. W of E line, SE cor. 330-ac. tr., Victor Pedraso Sur. ..... Drlg. 3,560 ft.

O. H. Parkening's No. 1 T. J. Taylor, C, Blk. 32, W. H. Payne Sur. ..... Began May 2; set 12½-in. 215 ft; drlg. 600 ft.

O. H. Parkening's No. 2 T. J. Taylor, C, J. C. Hawley Sur. ..... Derrick.

Ryan Consolidated Pet. Corp.'s No. 1 Dr. H. H. Key, 1,500 varas N of SE line, 500 varas E of SW line, of E. Carroll Sur. ..... Rigging up.

Seigel Bros. and Kelinson's No. 1 Taylor (no check), F. O'Neil Sur. ..... Derrick.

Thomas & Kinsey's No. 1 J. R. Watson, Thos. Iden Sur. . Derrick.

MARION COUNTY

Gist, Claunch & Dodson's No. 1 Miller, 1,470 ft. E line, 725 ft. N line, SW cor. H. Fulgran H.R. Sur. ..... Rigging up.

Geo. Hindman et al's No. 1 F. V. Lindsey, 2,500 ft. S, most northerly N line, 3,555 ft. E most easterly W line, Alexander Albright Sur. ..... Drlg. 1,850 ft.

Hindeman & Rhondo's No. 1 McGaughey, 1,647 ft. W, most northerly SW cor., 1,638 ft. N most northerly S line, W. J. Willis Sur. ..... Drlg. 2,730 ft.

P. E. Hussey's No. 1 A. A. Trammell, Chas. Lockhart Sur. ..... S.D. 1,884 ft.

Shelton et al's No. 1 J. M. McNeal, 800 ft. S, 400 ft. W, NE cor. McNeal's 721-ac. tr., R. Fowler Sur. .... Derrick.

PANOLA COUNTY

Everette Drlg. Co.'s No. 1 E. L. McDaniels, 200 ft. S, 200 ft. W, NE cor. McDaniels' 116 ac., Alanson Barr Sur. ..... Set 10-in. 110 ft; drlg. 1,315 ft.

Moses & Wallace's No. 1 Daniel, 600 ft. N and W lines Mrs. Gerrell 100-ac. tr., SW cor. Isabel Hanks Sur. .. Derrick.

The Texas Co.'s No. 2 G. W. Brumble, 400 ft. S, 200 ft. E, NW cor., Jno. Womack Sur. ..... Set 6⅝-in. 4,450 ft.

RED RIVER COUNTY

D. M. Buffington's No. 1 Hossler, E. Hughhart Sur. .... S.D. 2,795 ft.

Johnson Pet. Co.'s No. 2 Randolph, Edw. Dean Sur. ..... S.D. 2,280 ft.

SHELBY COUNTY

I. M. Bradley's No. 1 Ashberry (no check), G. W. Mitchell Sur. ..... Drlg. 813 ft.

E. L. Chapman's No. 1 Pickering Lbr. Co., C. E. Henry (headright) ..... Drlg. 3,025 ft.

Chapperell Oil Co.'s No. 2 Holt, Matthew Moore Sur. .. S.D. 3,111 ft.

H. H. Gracey's No. 1 J. A. Morrison, 1,500 ft. N, 200 ft. E, SW cor. J. A. Morris' 109-ac. tr., Wm. English Sur. ..... Began May 3; drlg. 50 ft.

Joiner et al's No. 1 Foster & Billingsly, 150 ft. W of CEL Foster & Billingsly's 109-ac. tr., J. Bowlin Sur.. Location.

T. A. Martin's No. 1 J. B. Bush, S 8° E, 2,000 ft. from NW cor. J. B. Bush's 77-ac. tr., thence E at right angles to said line 200 ft., Alfred Lindsey Sur. .... Moving in rig.

Henry Maulding's No. 1 Frost Lbr. Co., NE cor. Frost Lbr. Co.'s 80-ac. tr., A. D. Fountain Sur. ..... Drlg. 1,600 ft.

Schultz et al's No. 1 Hughes, 150 ft. SW cor. Hughes' 110-a tr., J. Clay Sur. ..... Rig up.

Sloan Prospecting Co.'s No. 1 Sanford, approximately 300 ft. N and 200 ft. E, SW cor. B. Sanford 49-ac. tr. in M. M. Vann Sur. ..... Set 12-in. 300 ft; T.D. 400 ft.

Sloan Prospecting Co.'s No. 1 Windham, H. English H.R.S. ..... Cored sand; S.O. 2,652-69 ft.

WILDCAT OPERATIONS IN MISSISSIPPI

CLARK COUNTY

Company, farm and location—	Remarks:
Gulf Ref. Co.'s No. 1 Box, 516 ft. W, 498 ft. N, C, SE, Sec. 11-2n-15e	Changing drlg. line 4,387 ft.

CLAY COUNTY
(Cable tools)

Ohio Oil Co.'s No. 1 Cantrell, NE cor., Sec. 16-15-5 ..... Drlg. 3,640 ft.

GRENADA COUNTY

Carter Oil Co. et al's No. 2 Dubard, NW cor., Sec. 18-22n-4e ..... Set 12½-in. 786 ft; drlg. 1,130 ft.

HINDS COUNTY

Attkisson & Dyer's No. 1 Downing et al, SE NE, Sec. 27-6-1 ..... S.D. funds 1,845 ft.

Cane River O. & G. Co.'s No. 1 Kabbles, NE cor. SW SW, Sec. 15-5-1e.. ..... Dry and abd. 3,297 ft.

Howard Oil Co.'s No. 1 Jackson College, C NW NW, Sec. 9-5-1e ..... S.D. 74 ft.

Industrial G. & E. Co.'s No. 1 Ill. Central R.R., 2,400 ft. E, 100 ft. S, C, Sec. 4-5n-1e ..... Drlg. 2,437 ft.

Southern Pet. Co.'s No. 1 Wilson (was Tri-State O. & G. Co.'s), 328 ft. E, 240 ft. N, SW cor. SE NE, Sec. 28-6-1e ..... S.D. 20 ft; W.O.

JASPER COUNTY

Bay Springs Pet. Co.'s No. 1 Keys, C NW NE, Sec. 2-12-9 ..... Reaming 1,477 ft.

MONROE COUNTY

Amory Dev. Co.'s No. 1 Bourland, Sec. 2-13-19 ..... S.D. 3,015 ft.

Park Bowser et al's No. 1 Cowart, second hole, Sec. 2-13-19 ..... Drlg. 2,185 ft.

RANKIN COUNTY

Attkisson & Dyer's No. 1 Valentour, 200 ft. S, 200 ft. E, NW cor., Sec. 18-5n-2e ..... Derrick.

Grandstaff et al's No. 1 Carr, 2,780 ft. W, 550 ft. N, SE cor., Sec. 12-5n-1e ..... Drlg. 1,320 ft.

Harding & Flint's No. 1 Webb, center Lot 32, Blk. B, East Jackson Place, Jackson City Sbd., Sec. 13-5-1.. Rigging up.

R. A. Moore et al's No. 1 Interior Lbr. Co., Sec. 28-4-1e.. S.D. 900 ft.

Cleve Love's No. 1 Muse, SE cor. SW SW, Sec. 32-7-4e.. S.D. for fuel 3,588 ft.

Love Pet. Co.'s No. 1 Interior Lbr. Co., Sec. 28-4n-2e.... Abd. 867 ft.

SCOTT COUNTY

M. U. Culley et al's No. 1 Owen, Sec. 2-8-9 ..... Derrick.

WARREN COUNTY

Dixie Pet. Co.'s No. 1 Henry, 1,375 ft. W, 380 ft. N, SE cor. NE, Sec. 36-17-4, of Choctaw Div. on Lot 2.. Drlg. 1,491 ft.

Eagle Bend O. & G. Co.'s No. 1 Kiger, SW cor. SW SE, Sec. 9-18-3 ..... Rigging up.

WINSTON COUNTY

Miss. Drlg. Co.'s No. 1 Scarbrough, NW cor., Sec. 15-13-14 ..... Drlg. 2,937 ft.

YALOBUSHA COUNTY

Collett-Carter Oil Co.'s No. 2 Blackmur, 990 ft. W, 286 ft. N, C, Sec. 14-11-4 ..... Recemented 8¼-in. 2,438 ft; T.D. 2,960 ft.

SOUTHWEST TEXAS PROVEN AREAS

(Continued from Page 42)

CARTWRIGHT POOL—LIVE OAK COUNTY

Houston Oil Co.'s No. 3 Dunning, M. B. Kilvin Sur. .... Moving in rig.

Houston Oil Co.'s No. 4 B. L. and C. C. ..... T. D. 5,724 ft.; drlg.

Houston Oil Co.'s No. 23 Cartwright, 691 ft. N, 30° E of No. 11 ..... Location.

CHITTIM POOL—MAVERICK COUNTY

Texas Gas Utilities Co.'s No. 6 Chittim, Sec. 116, Blk. 7, I.&G.N. Sur. ..... T. D. 5,590 ft.; comp. 4,500,000 ft. gas; tools stuck in hole.

Texas Gas Utilities' No. 8 Chittim, 24 ft. S of No. 7 Chittim ..... T. D. 600 ft.; drlg.

AGUA DULCE FIELD—NUECES COUNTY

Houston Oil Co.'s No. 1-B Ollie Purl ..... T. D. 6,010 ft.; drlg.

SAXET FIELD—NUECES COUNTY

Gulf Coast Oil Co.'s No. 1 Maggie Harrall, 330 ft. from S and W lines of Blk. 32, Sec. 311 ..... T. D. 2,000 ft.; drlg.

Houston Oil Co.'s (Andy Bowen) No. 1 Prieur, H. B. Sheppard Sur. ..... T. D. 1,465 ft.; waiting for csg.

W. L. Pearson Properties' No. 1 Dunn, 300 ft. S of Bay.. Shut down 2,600 ft.

L. L. Smith's No. 1 Hunter, 150 ft. from S and W lines of N half of Hunter tract ..... T. D. 200 ft.; drlg.

Saxet Oil Co.'s No. 8 Dunn, 1,000 ft. N, 500 ft. W of No. 7 Dunn ..... T. D. 3,300 ft.; drlg.

SCHOOLFIELD-O'BYRNE POOL—DUVAL COUNTY

Magnolia Pet. Co.'s No. 3 Wilson, 330 ft. from N, 1,720 ft. from W line of Sur. No. 134 ..... T. D. 2,349 ft.; set csg.; waiting on cement.

The Texas Company's No. 1 Bishop Duval Land Co., 330 ft. from S line, 1,520 ft. from W line, Sur. 135.. T. D. 2,340 ft.; set csg.; waiting on cement.

The Texas Company's No. 1 Bishop Duval Land Co., 330 ft. from S and 1,520 ft. from W line of Sur. No. 135 ..... Rigging up.

WHITE POINT FIELD—SAN PATRICIO COUNTY

Saxet Oil Co.'s No. 4 White Point ..... T. D. 4,953 ft.; set csg.

PRYOR FIELD—ZAVALA COUNTY

Texas Gas Utilities' No. 4 Pryor, 1,000 ft. NW of No. 3 Pryor ..... Location.

Texas Gas Utilities Co.'s No. 5 Pryor ..... T. D. 764 ft.; comp. 4,000,000 ft. gas.

LAREDO DISTRICT
KOHLER POOL—DUVAL COUNTY

Humble Oil & Refining Co.'s No. 50 Kohler, 2,805 ft. from S line, 165 ft. from W line of Sur. 164 ..... T. D. 6,084 ft.; set 9⅝-in. at 6,021 ft.; waiting on cement.

COLE POOL—DUVAL COUNTY

Magnolia Pet. Co.'s No. 1 W. Benavides, 330 ft. from N and W lines, Sur. 172 ..... Rigging up.

CAROLINA-TEXAS POOL—WEBB COUNTY

Carolina-Texas Oil & Gas Co.'s No. 9 Barnsley Sur. No. 768 ..... T. D. 2,575 ft.; comp. 40,000,000 ft. gas.

JENNINGS-MUCKELROY POOL—ZAPATA COUNTY

Allied Oil & Gas Co. and Allen & Morris' No. 15 Gutierres 2,317 ft. NE line, 200 ft. SE line of Share 4, Fansler's Partition, Comitas grant ..... T. D. 1,000 ft.; drlg.

E. C. Brogan's No. 1 Montemeyor, Blk. 11, Sur. 64 ..... Sand 1,494-1,500 ft.; tested salt water.

J. I. Newton's No. 3 Trevino, Blk. 7, Sur. No. 66 ..... Location abandoned.

O. W. Killam's No. 7 Bustamente, 450 ft. from SE and SW lines of Blk. 7, Share 5, Comitas grant ..... T. D. 1,200 ft.; drlg.

CUELLAR POOL—ZAPATA COUNTY

O. W. Killam's No. 40-C Cuellar, Sur. No. 278 ..... Derrick.

WILDCAT OPERATIONS IN SOUTHWEST TEXAS

(Continued from Page 42)

Mauldin et al's No. 1 Kimball, 300 ft. S Grayburg's No. 1-A Kimball, S. Winship Sur. ..... T. D. 3,544 ft.; put in coarser screen; swabbing.

BEXAR COUNTY

Ingersoll-Miller's No. 1 E. B. Carruth in Francisco Rolen Sur. ..... T. D. 390 ft.; shut down.

John F. Camp's No. 1 Chevez, 12 miles S of San Antonio ..... Rigging up.

J. M. Russell's No. 1 F. L. Price, 1,500 ft. to N line, 660 ft. W of tract in Angel Navarro Sur. ..... T. D. 1,130 ft.; drlg.

Schneider, Rees et al's No. 2 Claussen, 12 miles NE of San Antonio ..... T. D. 702 ft.; shut down.

Russell & Moore's No. 3 Mills, Angel Navarro Sur. No. 5 ..... T. D. 940 ft.; abandoned.

CALDWELL COUNTY

Mills et al's No. 1 McMahon, 275 ft. SW line, 75 ft. SE line of tract, J. Pinchback Sur. ..... T. D. 2,337 ft.; fishing.

M. O. Rayor's No. 1 Dunlap, 150 ft. NW and NE lines of farm, Solomor Seal Sur. ..... T. D. 2,368 ft.; hole lost; skidding rig.

R. R. Ogden's No. 1 O. S. Alexander, 1,200 ft. from N line, 150 ft. from E line of S. Spiller Sur. ..... T. D. 450 ft.; drlg.

COMAL COUNTY

Caldwell & Lanier's No. 1 T. J. Byler, 175 varas from W line, 370 varas from N line of 320-ac. tract in the H.E.&W.T. No. 5[illegible]4 Sur. ..... T. D. 655 ft.; drlg.

DEWITT COUNTY

Gibson & Sturm's No. 1 Clark, Dolores Alderete Sur. .... Rigging up.

DUVAL COUNTY

Coffee et al's No. 1 Jose Garza, center Sur. 49 ..... T. D. 825 ft.; drlg.

Magnolia Pet. Co.'s No. 1 W. Benavides, 330 ft. N and W lines of Sur. No. 172 ..... T. D. 250 ft.; drlg.

O'Byrne et al's No. 1 Well, B.S.&F. Sur. No. 568 ..... T. D. 1,830 ft.; repairing boiler.

S. J. Carpenter et al's No. 1 Juan Benavides, Blk. 38, Mesquite grant ..... T. D. 1,669 ft.; set csg.

FAYETTE COUNTY

Elam & Reynolds' No. 1 Florence, M. Muldoon Sur. No. 13 ..... T. D. 1,914 ft.; drlg.

FRIO COUNTY

A. H. Wray's No. 1 Burns estate, 700 ft. N, 330 ft. E of C Sec. 123, Antone Hupzor ..... T. D. 3,716 ft.; plugging back to shut off sulphur water.

GOLIAD COUNTY

Gibson Oil Co.'s No. 1 Cyrus Parks, 3,000 ft. S and 2,500 ft. E of NW cor. of Parks ranch, Ferguson Sur. ..... T. D. 4,257 ft.; coring.

GUADALUPE COUNTY

Harry J. Bruner's No. 1 Jim Sherrill, 150 ft. N line, 1,360 ft. W line of tract, George Allen League ..... Spudded in.
McGarrity et al's No. 1 A. Wesch, Jr., 150 ft. to N and E lines of farm, H. M. Thompson Sur. ..... T. D. 475 ft.; drlg.
Schleyer, Atherton and Armstrong's No. 1 Ogletree, Robert Smith Sur. ..... T. D. 1,417 ft.
Linne et al's No. 1 J. E. Linne, center 263-ac. tract in V. Cortario Sur. ..... Moving in tools.
San Antonio Oil & Royalty Co.'s No. 1 Dibrell, 150 ft. from N and W lines of Sec. 6, H.&T.C.R.R. Sur. ..... Location.

HAYS COUNTY

J. C. Jones et al's No. 1 Byder, John Ingram Sur. .... T. D. 830 ft.; set csg.

JIM HOGG COUNTY

Magnolia Pet. Co.'s No. 1 Cuellar, Sur. No. 575 ..... T. D. 3,832 ft.; drlg.
Peterman & Minahan's No. 1 Palacios, Sur. No. 231 .... T. D. 1,360 ft.; drlg.
D. C. DeWitt's No. 1 Teofilo Gomez, 1,170 ft. from N line, 150 ft. from W line of Sur. 12 ..... T. D. 200 ft.; drlg.

JIM WELLS COUNTY

Carsil Oil & Gas Co.'s No. 2 McGill, 900 ft. due N of No. 1 in D. Baldwin Sur. ..... T. D. 2,700 ft.; coring.
Gulf Production Co.'s No. 3 Shaeffer, center of J. T. White Sur. ..... T. D. 2,415 ft.; drlg.
Prairie Lee Prod. Co.'s No. 1 Oppenheimer ..... T. D. 1,000 ft.; shut down; waiting for heavier rig.
Smith Clark Co.'s No. 1 Cuero Cattle Co. ..... Location.

KENDALL COUNTY

Borgett et al's No. 1 Haag, W. Avery Sur. ..... T. D. 1,165 ft.; shut down.
Sitton et al's No. 1 Garvin, C of NE of D. L. Richardson Sur., in the D. L. Richardson Sur., 1 mile NE from Kendalia ..... T. D. 1,420 ft.; waiting on cement.
Dixon Oil Co.'s No. 1 Ottmer Behr, W of H.T.&B.R.R. Sur., 3½ miles SE from Sisterdale ..... T. D. 2,600 ft.; drlg.
Hicks et al's No. 1 Speck & Wiedner, Thomas Sur. No. 27, 2 miles S of Twin Sisters ..... Location.
P. B. Sterling's No. 1 R. J. McCrocklin, 1,350 ft. from N line, 250 ft. from W line of the B. G. Owens Sur., 4 miles W from Kendalia ..... T. D. 1,600 ft.; shut down.
R. M. Perkins' No. 1 J. Lawhorn, Sec. 10, 2,475 ft. E line, 1,483 ft. S line ..... T. D. 600 ft.; moving in new rig.
Permian Oil Co.'s No. 1 Taylor, Sec. 18, G.B.&G. Sur. .. T. D. 1,814 ft.; fishing for bit.

KERR COUNTY

Herbert Oil Co.'s No. 1 J. D. Witt, 1,320 ft. N line, 1,220 ft. W line of Sec. 1,922, W. H. Hamilton Sur... Location.
Evans & Gant's No. 1 Selker-Mears, C.C.S.D.&R.G.N.G. Sur. No. 1,605 ..... T. D. 1,650 ft.; running 8-in. csg.
Evans & Gant's No. 1 E. Young, A. E. Burge Sur. No. 28 ..... Rigged up and shut down.
Evans & Gant's No. 2 Love, in Sur. 1,594, located 560 ft. S of S line of Sur. 1,597 ..... Building derrick.
Evans & Gant's No. 1 Jeff Love, 1,320 ft. from W line of Sur. 1,594 and 660 ft. S of S line of Sur. 1,597 ..... T. D. 2,391 ft.; to deepen.
B. M. Hatfield's No. 1 Westland, Blk. 23, Westland Subd. to Kerrville ..... T. D. 460 ft.; standing.
Evans & Gant's No. 2 Jeff Love, SW cor. Sec. 1,593 ..... Rigging up.

KIMBLE COUNTY

C. L. Bryant et al's No. 1 Lambert, 7,700 ft. N and W lines of F. Lotta Sur. ..... T. D. 850 ft.; standing.
Kamon et al's No. 1 Hodges ..... T. D. 2,845 ft.; drlg.

LASALLE COUNTY

Fred W. Vales' No. 1 Coleman, 200 ft. from S and E lines of SW Sec. 514, B.S.&F. Sur. ..... T. D. 40 ft.; standing.

LIVE OAK COUNTY

Burke-Greis Oil Co.'s No. 1 West Ranch, James Vaughan Sur. ..... T. D. 450 ft.; set surface csg.
Illinois Exploration Synd.'s No. 1 Reeves-Brown, 1,300 ft. S of Sellers tract, 1,800 ft. E of Ry ..... T. D. 2,145 ft.; standing.
Sid Keoughan's No. 1 C. E. Terrell, 600 ft. from N line, 1,000 ft. from E line, Dan O'Boyle Sur. ..... T. D. 2,840 ft.; shut down.

LEE COUNTY

Burt et al's No. 1 R. C. Saunders, J. Maxmillan Sur. .... T. D. 3,312 ft.; drlg.
A. H. Wheeler and associates' No. 1 fee, Blk. 47, H. Donohue Sur. ..... T. D. 3,103 ft.; drlg.
C. B. Polk et al's No. 1 Stoltz, Hiram Donohue Sur. .... T. D. 1,715 ft.; fishing.

McLENNAN COUNTY

C. E. Groone et al's No. 1 League ..... T. D. 1,230 ft.; shut down.

McMULLEN COUNTY

Belt Pet., Inc.'s No. 1 Martin, 150 ft. NW line, 150 ft. to SW line of E. Melon No. 212 Sur. ..... T. D. 28 ft.; standing.
Camp and Stanolind's No. 1 Murphy, 1,845 ft. from W line, 165 ft. from N line, Sur. 123 ..... Rigging up.
Whall, Scherer et al's No. 1 Shiner, Henry Brewer Sur... T. D. 1,630 ft.; drlg.

MEDINA COUNTY

Donaldson Oil & Gas Co.'s No. 2 Adams .. .. T. D. 130 ft.; standing.
J. H. Hickey's No. 1 Jungman, at N end Chicon Lake... T. D. 425 ft.; drlg.
Sunflower Oil Co.'s No. 1 Mofield, J. Brothag Sur. No. 522 ..... T. D. 1,775 ft.; drlg.
Yancey Development Co.'s No. 1 Fassler, Sur. No. 801.... T. D. 1,400 ft.; showing oil and gas.

MILAM COUNTY

Dil-Tex Oil Corp.'s No. 1 Dilbeck, 450 ft. N and E lines of farm, Fernando Rodrigues Sur. ..... T. D. 798 ft.; drlg.
H. Elliott's No. 1 Kirkman, 150 ft. from NE lines of farm in M. Park Sur., NW from Gabriel ..... T. D. 1,050 ft.; drlg.
Rheubotham & Tate's No. 1 Johnson, 325 ft. from N line, 250 ft. from W line of 40-ac. tract, D. Robinson Sur. ..... T. D. 2,175 ft.; shut down.
Red Bank Oil Co.'s No. 1 Foster, A. G. Berry Sur. .... Derrick.
McMasters and Pomeroy's No. 1 Pluger, J. J. Acosta Sur... T. D. 1,200 ft.; shut down.
J. E. McKee et al's No. 1 Littleton, 150 ft. from N and 225 ft. from W line of lease, C. Chevalier Sur. ..... T. D. 510 ft.; shut down.
Peggie Brothers' No. 1 M. Reed ..... T. D. 780 ft.; shut down.

REAL COUNTY

McGinley Corp.'s No. 1 Haby, C of SW Sec. 175 ..... T. D. 1,700 ft.; drlg.
Gant-Kilgore and Evans' No. 1 A. D. Auld, C.C.S.D.& R.G.N.G. Sur. No. 23 ..... T. D. 3,285 ft.; waiting on cmt.

STARR COUNTY

B. B. Tips' No. 1 F. Dayno, Lot 1, Porcion No. 81 ..... T. D. 332 ft.; waiting on cmt.
Menyard et al's No. 1 Sealbury, 150 ft. from E line, 650 ft. from N line, Share 5, Porcion 75, Jurisdiction of Carmargo ..... T. D. 411 ft.; tested dry.
Los Olmos Oil Co.'s No. 4 Kelsey-Bass, 2,208 ft. from W line, 60 ft. from N line, Blk. 7, Subd. Porcions 75, 76 and 77, Jurisdiction of Carmargo ..... T. D. 143 ft.; drlg.

SAN PATRICIO COUNTY

George B. Pickett's No. 1 Baldwin, 900 varas due E of Denton, 1,200 ft. S of the SE cor. of O'Neill Sur., Abstract 211 ..... T. D. 4,020 ft.; shut down.
Saxet Oil Co.'s No. 1 Carroll, 8 miles N of Gregory .... Derrick.

TRAVIS COUNTY

Fort Bend Oil Co.'s No. 1 Engleman, 450 ft. N line, 150 ft. W line of 103-ac. tract, J. H. Denson Sur. .... T. D. 2,100 ft.; shut down.
F. W. Fuchs' No. 1 Ballersted, A. Alexander Sur. ..... Derrick.
Franklin et al's No. 1 Wilson, A. Alexander Sur. ..... Derrick.
Marts et al's No. 1 Oswald ..... T. D. 1,100 ft.; shut down.
Ratcliffe et al's No. 1 Jim Jones, 1,000 ft. S line, 750 ft. E line of farm in Amos Alexander Sur. ..... T. D. 305 ft.; drlg.
Waldron et al's No. 1 Cook, D. H. Minor Sur., 8 miles SW of Austin ..... T. D. 645 ft.; drlg. shale.
Taylor Temple Oil Co.'s No. 1 Smith, L. Kimbro Sur..... T. D. 763 ft.; tested salt water.
Behle & Wilson's No. 1 Norton, J. Cole Sur. ..... Derrick.

WEBB COUNTY

Cole Pet. Co.'s No. 4 Benavides, Sur. No. 1,601 ..... T. D. 1,710 ft.; fishing.

WILLIAMSON COUNTY

Fritz Fuchs' No. 1 L. W. Fuchs, Cartwright Sur. ..... T. D. 2,231 ft.; trying to shut out water.
Wilburn et al's No. 1 Caroline Hurts, P. Coursey Sur. .... T. D. 1,327 ft.; shut down.
Wilson et al's No. 1 Walker ..... T. D. 2,260 ft.; shut down.

WILSON COUNTY

A. M. Blume's No. 1 Nickolson, C. Diaz Sur. ..... T. D. 460 ft.; drlg.
Stover & Wren's No. 1 John Ruess, 10,400 ft. from SW line, 2,300 ft. from NW line, O. A. Trevino Sur. No. 19 ..... T. D. 1,100 ft.; shut down.

ZAPATA COUNTY

T. H. Ward's No. 1 Uribe, 150 ft. NW line, 150 ft. SW line, Blk. 8 Subd., Share 7, Partition No. 6, T. Uribe Partition of Jose V. Borrego Sur. ..... Rigged up and standing.
Benson Oil Co.'s No. 1 S. Vela, W cor. of Blk. 12, Sur. No. 359 ..... T. D. 1,675 ft.; drlg.
Bill Henry et al's No. 1 Gopher Trust estate, Borrego grant ..... T. D. 1,398 ft.; laying water line.
Lowe & Rogers' No. 2 P. Benavides, 170 ft. from SW, 340 ft. from NW line, Blk. 13, Sur. No. 613 ..... T. D. 1,353 ft.; comp. 40,000,000 ft. gas.
Penny Prod. Co.'s No. 1 Juan V. Cuellar, Jr., et al, 175 ft. NE line, 175 ft. SE line Poppas Subd., Porcion 33 and 34, Blk. 1, Sur. 2 ..... T. D. 2,035 ft.; reaming.
National Oil Co.'s No. 1 Zapata Trust Estate, 617 ft. NW line, 96 ft. NE line, Blk. 97, De Prom Subd., Porcion 6 ..... T. D. 690 ft.; drlg.
National Oil Co.'s No. 2 Adams, 150 ft. from NW line and SW line, Blk. 11, Borrego grant ..... T. D. 1,262 ft.; drlg.
Mackenzie & Talmadge's No. 1 Trevino, 400 ft. SE line, 200 ft. NE line, Blk. 6, Sur. No. 4, Porcion 2 and 3 ..... T. D. 520 ft.; standing.

GULF COAST FIELDS AND WILDCATS

(Continued from Page 39)

Sinclair Oil & Gas Co.'s No. 3 Smith, W. D. Smith Sur., 50 ft. out of S cor. of tract ..... Drlg. lime rock 3,582 ft.
Sun Oil Co.'s No. 2 Smith, W. D. Smith Sur., 75 ft. from W line, 50 ft. from N line of tract ..... Drlg. rock 3,938 ft.
Sun Oil Co.'s No. 3 Smith, W. D. Smith Sur., 50 ft. from S line, east offset Yount Lee Oil Co.'s No. 3 Winfree ..... Drlg. gumbo 1,514 ft.
Sun Oil Co.'s No. 2 Winfree, W. D. Smith Sur., 450 ft. SE along SW line from NW cor. of tract and 50 ft. NE at right angles ..... Drlg. rock 2,482 ft.
Sun Oil Co.'s No. 14 Wilburn fee, east ..... Junked hole 4,162 ft.; skidded derrick 36 ft. east; temporarily abandoned.
The Texas Company's No. 2 Winfree, west flank, W. D. Smith Sur., 264 ft. N, 50 ft. W at right angles out of SE cor. of lease ..... Drlg. lime rock 5,160 ft.
The Texas Company's No. 3 Winfree, west flank, W. D. Smith Sur., 478 ft. N and 50 ft. W at right angles.... Sand and shale showing oil 5,374 ft.; cmtd. 9⅝-in. csg. 5,360 ft.
The Texas Company's No. 4 Wilburn (D.D.), Henry Griffith League, approximately 1,700 ft. from W line and 50 ft. from S line of tract ..... Cmtd. bottom of hole 5,292 ft.
The Texas Company's No. 6 Wilburn, Henry Griffith League, 250 ft. W of No. 4 and 50 ft. from S line of lease ..... Rig.
Yount Lee Oil Co.'s No. 9 Chambers (D.D.), Wm. Bloodgood Sur., 550 ft. from N line and 1,660 ft. from W line of tract ..... Pulling liner to deepen 4,841 ft.
Yount Lee Oil Co.'s No. 3 Winfree, W. D. Smith Sur., 100 ft. out of NE cor. of tract ..... Drlg. sand and lime 2,793 ft.

RACCOON BEND—AUSTIN COUNTY

Humble & Valley's No. 1 Martha Remmert ..... Location.

HUMBLE—HARRIS COUNTY

Rio Bravo Oil Co.'s No. 2 H.E.&W.T., Adams Sur., 250 ft. N along railroad tract from No. 1 and 25 ft. W from center of said tract ..... Drlg. sandy lime and shale 2,785 ft.
Rio Bravo Oil Co.'s No. 1 Westheimer, John Brown Jones One-Third League, 800 ft. from E line and 100 ft. from S line of Blk. 1, in Lot 48, Westheimer Subd. ..... Location.
Sun Oil Co.'s No. 16 Bender, Adams Sur., Bender South Addition, 110 ft. N of N line of H.E.&W.T. 150-ft. right of way and 75 ft. E of center line of right of way ..... Drlg. shale and lime 3,031 ft.
Sun Oil Co.'s No. 22 Bender, Adams Sur., 200 ft. NE at right angles from midway point on line between Nos. 3 and 20 ..... Drlg. shale 4,529 ft.
Sun Oil Co.'s No. 23 Bender, Adams Sur., 300 ft. NW of No. 21 in line with Nos. 21 and 15 ..... Sand and shale showing oil 4,807 ft.; cmtd. 7-in. csg. 4,740 ft.
Sun Oil Co.'s No. 24 Bender, W. B. Adams Sur., 24 ft. N of Rio Bravo's No. 2 H.E.&W.T. on Sun's east line ..... Rig.
Sun Oil Co.'s No. 1 O'Connor, Adams Sur., 75 ft. from S line and 75 ft. from E line of 1-acre tract by S.P. depot ..... Drlg. rock 2,669 ft.
Trapshooter Oil Co.'s No. 2 Rosenbaum ..... Standing 4,067 ft.

PIERCE JUNCTION—HARRIS COUNTY

Rio Bravo Oil Co.'s No. 14-A Settegast (workover)..... Drlg. hard sand 5,003 ft.
Rio Bravo Oil Co.'s No. 21-A Settegast, J. Kopman Sur., 400 ft. S and 200 ft. N of NE cor. "A" lease.... Drlg. sticky shale and lime 4,042 ft.
Smith et al's No. 1 Bender fee, B.B.B.&C. Sur. No. 1,028, 173 ft. from E line and 14 ft. from N line of Lot 40, Jones Subd. ..... Sand showing oil 4,467 ft.; cmtd. 6⅝-in. csg. 4,159 ft.; drilled plug and set 1 jt. 4½-in. screen 4,469 ft.; comp. pumping 15 bbls. daily.

BIG CREEK—FORT BEND COUNTY

Gulf Prod. Co.'s No. 52 Davis, M. Young Sur. (workover).. Total depth 4,232 ft.; sidetracked to sand 3,898-3,917 ft.; tested salt water and abandoned.

NASH—BRAZORIA COUNTY

Rycade & Abercrombie's No. 5 Wisdom (D.D.) ..... Set 50 ft. 3-in. screen 4,252 ft.; tested salt water and abandoned.

LOST LAKE—CHAMBERS COUNTY

Pure Oil Co.'s No. 13 Mayes, B.B.B.&C. Sur. No. 4, 75 ft. W and 700 ft. S of NE cor. of survey..... Drlg. gumbo 3,659 ft.

SPINDLETOP—JEFFERSON COUNTY

Gulf Production Co.'s No. 7 Mann (D.D.), John Douthit Sur. ..... Sand showing oil 3,768-83 ft.; set 1 jt. 4½-in. screen; bailed salt water.

HIGH ISLAND—GALVESTON COUNTY

Yount Lee Oil Co.'s No. 20 Cade ..... Rig standing.
Yount Lee Oil Co.'s No. 21 Cade, Fitzsimmons Sur., 150 ft. W of No. 17 ..... Drlg. shale and lime 2,610 ft.

NORTH DAYTON—LIBERTY COUNTY

M. L. Gray's No. 1 Schindler, H.E.&W.T. Sur. No. 120, 100 ft. E and 250 ft. N of SW cor. of sur..... Drlg. rock 1,138 ft.
Harrison-Abercrombie's No. 2 Jones, H.&T.C. Sur. No. 125, 50 ft. from N line and 450 ft. from E line of tract ..... Drlg. gumbo 902 ft.

ORCHARD—FORT BEND COUNTY

Gulf Production Co.'s No. 29 Moore, John Frazier Sur., 600 ft. N of 26 in line with Nos. 25 and 26..... Drlg. shale and lime 2,633 ft.

DAMON MOUND—BRAZORIA COUNTY

D. C. Wellock's No. 1 Hamon, John P. Mills Sur., 1,115 ft. NE line and 60 ft. W line Blk. 1 ..... Shut down 200 ft.

CLAY CREEK—WASHINGTON COUNTY

Sun Oil Co.'s No. 3 W. F. Schlottman, J. F. Perry Sur., 300 ft. from NE line and 1,522 ft. from SE line of tract ..... Cap rock 1,309 ft.; losing returns; abandoned.

ALLEN—BRAZORIA COUNTY

Mills Bennett Production Co.'s No. 1 Allen (workover), J. G. McNeel Sur., 1,211 ft. from W line and 2,569 ft. from N line of survey ..... Total depth 4,999 ft.; drlg. sidetracked hole in sand and lime 4,917 ft.

Mills Bennett Prod. Co.'s No. 1 Poole, T. & W. Alley League, 1,390 ft. from E line and 100 ft. from S line (workover) ..... Heaving shale 4,902 ft.; set whipstock 3,916 ft.; to sidetrack second time.

ESPERSON—LIBERTY COUNTY

Cranfill-Reynolds' No. 7 Davis, David Kokernot Sur., 100 ft. S of No. 4 ..... Drlg. hard shale and lime 4,480 ft.

Cranfill-Reynolds Oil Co.'s No. 1-C Kirby fee ..... Drill stem stuck 6,154 ft.; drlg. sidetracked hole; sand and shale 6,026 ft.

Cranfill-Reynolds Oil Co.'s No. 2 Moore's Bluff (workover) ..... Total depth 3,629 ft.; drlg. sidetracked hole in sand and lime 3,170 ft.

BLUE RIDGE—FORT BEND COUNTY

Teischow, Cady et al's No. 5 Blakely, E. Drew Sur., 90 ft. E, 150 ft. S of NW cor. of E half, Lot 4, Blk. F ..... Drlg. gumbo 2,347 ft.

HANKAMER—LIBERTY COUNTY

Gulf Production Co.'s No. 13 Boyt, H.&T.C. Sur. No. 22, 500 ft. N of No. 1 in line with Nos. 6 and 11 ..... Sand and shale showing oil 3,816 ft.; cmtd. 9⅝-in. csg. 3,765 ft.

SARATOGA—HARDIN COUNTY

Rio Bravo Oil Co.'s No. 101-A Cotton ..... Set screen 514 ft.; comp. pumping 30 bbls. oil.

Rio Bravo Oil Co.'s No. 115-A Cotton ..... Spudded.

MOSS BLUFF—LIBERTY AND CHAMBERS COUNTIES

Humble Oil & Ref. Co.'s No. 2 Sergeant, east flank ..... Standing 5,931 ft.

Humble Oil & Ref. Co.'s No. 7 Sterling, J. McFaddin Sur., 350 ft. S and 100 ft. W No. 6 Sterling ..... Drlg. sand and shale 5,939 ft.

Texas Gulf Sulphur Co.'s No. 4 Carter, B. M. Spinks Sur., 100 ft. from N line and 100 ft. from E line of 60-acre tract ..... Abandoned location.

Texas Gulf Sulphur Co.'s No. 1 A. Z. Gardner, B. M. Spinks Sur., 100 ft. W and 100 ft. S of NE cor. 60-acre tract ..... Abandoned location.

Texas Gulf Sulphur Co.'s No. 1 V. R. McManus, B. M. Spinks Sur., 200 ft. S and 100 ft. W of NE cor. 125-acre tract ..... Sulphur test.

Texas Gulf Sulphur Co.'s No. 2 V. R. McManus, B. M. Spinks Sur., 1,500 ft. W and 100 ft. S NE cor. 125-acre tract ..... Abandoned location.

Texas Gulf Sulphur Co.'s No. 3 V. R. McManus, B. M. Spinks Sur., 100 ft. S and 100 ft. E NW cor. 125-acre tract ..... Abandoned location.

Texas Gulf Sulphur Co.'s No. 1 D. J. Harrison, B. M. Spinks Sur., 1,694 ft. N and 1,300 ft. E of SW cor. 485-acre tract ..... Sulphur test.

REFUGIO—REFUGIO COUNTY

Houston Oil Co.'s No. 14 Pratt-Hewitt-Rooke ..... Junked and abandoned 6,120 ft.

Houston Oil Co.'s No. 10 Wilson Heard, Refugio town tract, 150 ft. from N line and 150 ft. from E line of S 50-acre tract ..... Spudded.

Houston Oil Co.'s No. 3 Rose Lambert ..... Dry and abandoned 6,545 ft.

Houston Oil Co.'s No. 5 Mrs. M. H. Ryals, Refugio Town Tract, 150 ft. from N line of tract and 527 ft. east of No. 1 ..... Cmtd. 9⅝-in. surface csg. 514 ft.

Houston Oil Co.'s No. 6 Pratt-Hewitt-Rooke (D.D.), Thos. Mullen Sur., 1,150 ft. N and 200 ft. W of SE cor. of tract ..... Total depth 3,708 ft.; cutting csg. to deepen.

Larco Oil & Gas Co.'s No. 1 Strauch, C Lot 13, Blk. 2 ... Coring sand 3,690 ft.

Mission Drilling Co.'s No. 2 Moss-Powers, C, Blk. 109, townsite ..... Coring shale 6,442 ft.

Mission Drilling Co.'s No. 2 J. J. O'Brien, Refugio town tract, 150 ft. from E line and 150 ft. from S line 12½-acre tract ..... Spudded.

Moody-Seagraves Prod. Co.'s No. 6 Morgan-O'Connor ..... Total depth 6,470 ft.; plugged to 6,431 ft.; tested salt water; milling out 6,306 ft. to sidetrack.

Moody-Seagraves Prod. Co.'s No. 8 O'Connor, Refugio Town Tract, 350 ft. east of No. 1 and 150 ft. from S line of lease ..... Drlg. sticky shale 5,750 ft.

Moody-Seagraves Prod. Co.'s No. 2-A J. F. B. Heard ..... Rig standing.

Moody-Seagraves Prod. Co.'s No. 1 Shelly ..... Total depth 6,467 ft.; plugged to sand 6,450-54 ft.; set 1 jt. screen and 20 ft. blank; swabbing.

Pearson Properties' No. 5 Ryals, 174 ft. from S line of lease and 475 ft. E of No. 3 ..... Rig.

Ed Price's No. 3 Mission River, Refugio Town Tract, 750 ft. up river from No. 2 on S bank of river ..... Shut down 350 ft.

United Prod. Corp.'s No. 1-A Fox, L. Brown Sur., 750 ft. W along S line from SE cor. of lease and 1,000 ft. N of said line ..... Sand showing oil 5,880-86 ft.; cmtd. 5½-in. (O.D.) csg. 5,877 ft.

United Prod. Corp.'s No. 3 Fox (workover) ..... Total depth 6,434 ft.; abd.

United Production Corp.'s No. 6 O'Brien, 150 ft. from S line of tract, 350 ft. W No. 3 ..... Drlg. sand and shale 200 ft.

United Prod. Corp.'s No. 9 O'Brien, 150 ft. S of S line and 175 ft. E of extended W line of Moody-Seagraves' O'Brien "B" lease ..... Sand showing oil 6,451-62 ft.; cmtd. 7-in. (O.D.) 6,450 ft.

United Prod. Corp.'s No. 6 Power, S Blk. 83, Refugio Townsite ..... Sand showing oil 6,450-56 ft.; cmtd. 7-in. csg. 6,448 ft.

United Prod. Corp.'s (Union) No. 2-A Rose Lambert, 175 ft. W and 200 ft. N of SE cor., Blk. 1, of town tract ..... Dry and abandoned 6,536 ft.

United Production Co.'s No. 2 Mitchell, 150 ft. from N line and 609 ft. from W line of tract ..... Total depth 6,458 ft.; plugged to 6,445 ft.; set screen.

United Production Corp.'s No. 6 A. W. J. Heard, Refugio town tract, 1,253.6 ft. from W line and 257 ft. from S line of tract ..... Sand showing oil 3,662-72 ft.; cmtd. 9-in. (O.D.) csg. 3,662 ft.

SOUTH LOUISIANA FIELDS

LOCKPORT—CALCASIEU PARISH

Vacuum Oil Co.'s No. 31 Miller (D.D.), 360 ft. from N line and 900 ft. from W line of SW NE, Sec. 8-10s-9w ..... Sand showing oil 5,283 ft.; running 4½-in. csg.

Vacuum Oil Co.'s No. 7 State, 319 ft. N and 260 ft. W SE cor. NE, Sec. 8-10s-9w ..... Set 1 jt. 7-in. screen 6,567 ft.; tested salt water.

Yount Lee Oil Co.'s No. 2 Miller, 125 ft. N and 120 ft. W, SE cor. NE NW, Sec. 8-10s-9w ..... Drlg. shale and lime 5,124 ft.

EDGERLY—CALCASIEU PARISH

Rex Pet. Co.'s No. 2 Prairie Narroni, Sec. 21-9s-11w, 365 ft. from S line and 50 ft. from E line of lease ..... Cutting and pulling screen 4,087 ft.

HACKBERRY—CAMERON PARISH

Federal Petroleum Co.'s No. 2 Hebert, 660 ft. S and 660 ft. W of NE cor. NW NW, Sec. 33-12s-10w ..... Abandoned in shale 5,602 ft.

R. E. Seiss' No. 2 J. M. Vincent ..... Drlg. shale and lime 2,022 ft.

The Texas Company's No. 8 State ..... Derrick.

Yount Lee Oil Co.'s No. 34 State ..... Location.

Yount Lee Oil Co.'s No. 36 State ..... Location.

Yount Lee Oil Co.'s No. 37 State ..... Location.

Yount Lee Oil Co.'s No. 38 State ..... Location.

Yount Lee Oil Co.'s No. 39 State ..... Location.

VINTON—CALCASIEU PARISH

Vinton Pet. Co.'s No. 11 Matilda Gray (20 acres), 608 ft. from S line and 195 ft. from E line of tract in Sec. 33-10s-12w ..... Sand showing oil 3,452 ft.; cmtd. 6-in. csg. 3,417 ft.

Vinton Pet. Co.'s (Lucky Ten) No. 1 Lizzo ..... Tested salt water 3,285 ft.; pulling liner and screen.

BAYOU BOUILLON—ST. MARTIN PARISH

Humble Oil & Ref. Co.'s No. 4 State ..... Drlg. sandy shale 5,246 ft.

SWEET LAKE—CAMERON PARISH

Magnolia Pet. Co.'s No. 2 Sweet Lake, Sec. 5-13s-7w ..... No report.

Pure Oil Co.'s No. 10 Yount Lee ..... Sand showing oil 7,366-87 ft.; cmtd. 5¾-in. csg. 7,360 ft.

STARKS—CALCASIEU PARISH

Gulf Refining Co.'s No. 27 Lutcher-Moore, Sec. 19-9s-12w. Sand and shale showing oil 1,222 ft.; cmtd. csg.

SULPHUR—CALCASIEU PARISH

Union Sulphur Co.'s No. 762 fee (workover) ..... Salt 5,864-9,250 ft.; plugged to sand 4,964 ft.; to test.

Union Sulphur Co.'s No. 765 fee, Sec. 29-9s-10w ..... Drlg. shale 4,206 ft.

Union Sulphur Co.'s No. 766 fee, Sec. 29-9s-10w ..... Oil sand 4,954-67 ft.; cmtd. 6⅝-in. csg. 4,954 ft.

MISCELLANEOUS WILDCATS

TEXAS

AUSTIN COUNTY

Empire Gas & Fuel Co.'s No. 1 Kuntze, San Felipe ..... Drlg. shale 6,938 ft.

O'Hara et al's No. 1 Schrader ..... Drlg. sticky shale 3,768 ft.

Parmerson & Cafferkey et al's No. 1 W. M. Schlecte, John Fitzgibbons Sur., 1,850 ft. from SE line and 3,100 ft. from NE line of survey ..... Drlg. shale 978 ft.

BRAZORIA COUNTY

Faust et al's No. 5 Faust, Blk. B, Sec. 3, H.T.&W. Sur. ... Abandoned 6,514 ft.

Freeport Sulphur Co.'s No. 2,001 fee, Bryan Heights ..... Heaving shale 5,260 ft.; abd.

Amerada Pet. Corp.'s (Rycade) No. 2 Seaburn, Stratton Ridge ..... Heaving shale 7,624 ft.

The Texas Company's No. 1 Belcher, Manvel, 167 ft. SE of NW line and 223 ft. NE of SW line, Lot 18, Blk. A, Suburban Gardens Subd. ..... Rig.

United Oil Syndicate's No. 1 Speer, A. A. Talmadge Sur. ... Set 48 ft. 4½-in. screen 1,866 ft.; bailing.

BURLESON COUNTY

Mid-South Oil Co.'s No. 1 Duckworth ..... Shut down 2,646 ft.

Reynolds Oil Co.'s No. 1 Harris, 500 ft. from W line and 400 ft. from N line of J. M. McKean Sur. .... Shut down 400 ft.

CALHOUN COUNTY

The Texas Company's No. 1 Smith, J. Timmins Sur., Will Mousin and Driscoll Subd. ..... Drlg. sticky shale 4,909 ft.

COLORADO COUNTY

United North & South Oil Co.'s No. 1 H. P. Lockwood, 3,100 ft. S line and 2,000 ft. W line J. R. Johnson Sur. ..... Drlg. shale and lignite 2,854 ft.

FORT BEND COUNTY

H. R. Cullen's No. 1 Lockwood, John Rabb Sur., 475 varas from W line of E half of survey and 1,245 ft. from N line ..... Drlg. gumbo 2,356 ft.

HARRIS COUNTY

Humble Oil & Ref. Co.'s No. 5 Minnetex, Mykawa, 150 ft. from S line and 200 ft. from W line, Lot 261, Wm. Lovett Sur. ..... Location.

Humble Oil & Ref. Co.'s No. 6 Minnetex, Mykawa, Wm. Lovett Sur., C of Lot 254 ..... Drlg. hard sandy shale 3,614 ft.

JACKSON COUNTY

Chicago-Gulf Co.'s No. 1 Rogers (workover) ..... Drlg. hard shale 3,814 ft.

JEFFERSON COUNTY

Humble Oil & Ref. Co.'s No. 1 McFaddin, T.&N.O. Sur. 234 ..... Drlg. shale and lime 7,486 ft.

The Texas Company's No. 4 Pipkin, Big Hill ..... Heaving shale 5,903 ft.; washing down.

LIBERTY COUNTY

Hamm et al's No. 1 Harvard, Davis Hill ..... Gumbo 1,015 ft.; shut down.

Tucker et al's No. 1 Bell, H.&T.C. Sur. No. 4 ..... Gumbo 560 ft.; shut down.

MATAGORDA COUNTY

H. C. Cockburn's No. 2 Hawkins, Shepherd's Mott ..... Abandoned 5,221 ft.

H. C. Cockburn's No. 3 Hawkins, Shepherds Mott, 4,810 ft. SE along SW line of Farnum Fry Sur., thence 242 ft. NE at right angles ..... Location.

Empire Gas & Fuel Co.'s No. 1 Boker, Citrus Grove ..... Total depth 6,295 ft.; sidetracking in sand and shale 6,065 ft.

MONTGOMERY COUNTY

Lake Creek Oil Co.'s No. 1 Hunt, south of Conroe ..... Shut down 678 ft.; gumbo.

Price & Wilhite's No. 2 Juerges ..... Drlg. shale 2,908 ft.

ORANGE COUNTY

Altex Oil Co.'s (Veteran Oil Co.) No. 1 Reed, A. Nelson Sur. No. 1, 500 ft. from N line and 250 ft. from E line of tract ..... Formerly temporarily abnd. 4,603 ft.; sidetracked hole 1,200 ft.; drilled to 1,820 ft.; shut down.

Crew Oil Co.'s No. 1 Mansfield ..... Shut down 1,460 ft.

POLK COUNTY

Freeman et al's No. 2 Freeman ..... Drlg. rock 2,973 ft.

REFUGIO COUNTY

Blanco Creek Oil Co.'s No. 1 Damaan, 150 ft. from N line and 150 ft. from W line of Blk. 16, Bonnie View Ranch Subd. ..... Shut down in gumbo 4,014 ft.

Humble Oil & Ref. Co.'s No. 1 O'Connor, John Keating Sur., 6,012 ft. S from NE cor. along SE line of Lon T. Rios Sur., thence 7,375 ft. W at right angles in John Keating Sur. ..... Location.

SAN JACINTO COUNTY

E. P. Edward et al's No. 1 Bennett, northwest of Cold Springs ..... Spudded and shut down.

TYLER COUNTY

King Oil Co.'s No. 1 Caswell ..... Sand and shale showing oil 1,255 ft.; cmtd. 6-in. csg. 1,218 ft.

Allied Pet. Co.'s (Texas Southern Pet. Co.'s) No. 3 Wilson, Mrs. E. Cherry Sur. No. 798, 1,500 varas from W line and 600 varas from N line ..... Shut down 4,875 ft.

Lew Wentz' No. 1 Long Bell, 800 varas E and 100 varas N from SW cor. James Seals Sur. ..... Drlg. shale 4,056 ft.

VICTORIA COUNTY

Houston Oil Co.'s No. 1 Conrad, T.&N.O. Sur. No. 1, 1,100 ft. from SW line and 100 ft. from NW line ..... Derrick.

Newton et al's No. 1 West ..... Shut down 1,550 ft.

Simpson-Fell and Westheimer et al's No. 1 Levi, 2,200 ft. from SW line and 2,000 ft. from NW line of S.A.&M.G. Sur. No. 4 ..... Drlg. shale 2,010 ft.

T. B. Slick estate's No. 1 McFaddin, J. Vairan Sur., 17,700 ft. NE along SE line from S cor. of survey and thence 5,050 ft. NW at right angles ..... Drlg. shale 1,961 ft.

United Prod. Corp.'s No. 4-A McFaddin, M. Traviesa Sur., 1,320 ft. W along N line of C. L. Mann Sur. from NE cor. and 1,980 ft. N at right angles ..... Spudded.

WASHINGTON COUNTY

Joe Baker et al's No. 1 Kramer, Brenham, 600 ft. S and 300 ft. W NE cor. 92 acres ..... No report.

Penn-Tex Oil Co.'s No. 2 Kamas Brenham, S. M. Williams Sur. ..... Drlg. shale 2,871 ft.

Vegua Oil Co.'s No. 1 P. Graves, S. Clampet Sur. ..... Abandoned 855 ft.

WHARTON COUNTY

H. H. Givens' No. 3 Hudgins, I. B. Phillips Sur., 19 ft. W of No. 2 ..... Fishing drill stem 1,480 ft.

Poole & Chappell's No. 1 Poole, A. J. Fry Sur., Sec. 16, 8 ft. at right angles from center of SW line of sec. ... Abandoned 550 ft.

Poole & Chappell's No. 1 Lee, G.H.&H. R.R. Sur., Sec. 20, 75 ft. E and 25 ft. N from SW cor., Sec. 20.....Location.

SOUTH LOUISIANA

BEAUREGARD PARISH

Beauregard Gas & Oil Co.'s No. 1 J. E. Cochran, 400 ft. S and 700 ft. W from NE cor., Sec. 34-4s-12w.....Drlg. gumbo 1,050 ft.

CALCASIEU PARISH

Crawford Doyle's No. 1 Johnson, Sec. 23-9s-13w.....Shut down 875 ft.
J. O. Davis' No. 1 Industrial, Sec. 29-9s-10w.....Set 6⅝-in. csg. with 172 ft. 6⅝-in. screen on bottom 6,568 ft.; drilled plug and bailed dry; standing.
Wilfred Lahay's No. 1 Jardell, Sec. 16-10s-12w.....Shut down 3,258 ft.
Dr. Thomas et al's No. 1 John Hewitt.....Location.
Vacuum Oil Co.'s No. 1 Wait (D.D.), 225 ft. out of SE cor., Sec. 12-9s-7w.....Drlg. shale 5,195 ft.

CAMERON PARISH

Vacuum Oil Co.'s No. 2 Cameron Meadows, 3,120 ft. S and 1,900 ft. W from NE cor., Sec. 21-14s-9w (500 ft. S No. 1).....Drlg. shale and lime 3,556 ft.
The Texas Company's No. 7 State, Calcasieu Lake.....Location.

IBERIA PARISH

Jefferson Lake Oil Co.'s No. 11 Lake Peigneur, Jefferson Island.....Set perforated pipe for sulphur test, anhydrite 869 ft.

IBERVILLE PARISH

Standard Oil Co.'s No. 1 Gay, Bayou Choctou.....T. D. 4,180 ft.; sidetracking 4,110 ft.
Standard Oil Co.'s No. 7 Wilbert, Bayou Blue.....Derrick.
Standard Oil Co.'s No. 6 Schwing, Bayou Blue, Sec. 73-9s-11e, 317 ft. S of No. 2.....Capping piling.
Standard Oil Co.'s No. 9 Wilbert, Bayou Des Glaise, 700 ft. E and 760 ft. N of SW cor. SE SW, Sec. 78-8s-8e..Drlg. 3,102 ft.
Standard Oil Co.'s No. 1 Baist Cooperage, Bayou Blue....Abandoned in salt 3,861 ft.

JEFFERSON DAVIS PARISH

A. V. Peters' No. 1 Smith Subd., Welsh, 1,050 ft. N and 180 ft. E SW cor., Sec. 22-9s-5w.....Shut down 1,140 ft.

PLAQUEMINES PARISH

Humble Oil & Ref. Co.'s No. 2 Cockrell-Moran, Lake Grand Ecaille, Sec. 14-20s-26e.....Abandoned 5,861 ft.
Humble Oil & Ref. Co.'s No. 4 Cockrell-Moran, Sec. 14-20s-26e, 1,905 ft. S and 2,860 ft. E of station.....Rig.

TERREBONNE PARISH

The Texas Company's No. 6 State, Caillou Island.....Drlg. sticky shale 4,492 ft.
The Texas Company's No. 1 La.L.&E., Bay St. Elaine..Hard sand and lime 4,751 ft.; drill stem stuck.
The Texas Company's No. 4 State, Dog Lake.....Drlg. rock 2,734 ft.
The Texas Company's No. 5 State, Four Isle.....Abandoned in salt 1,507 ft.
The Texas Company's No. 3 La.L.&E., Bay Junop.....Location.
The Texas Company's No. 4 La.L.&E., Bay Junop.....Location.
The Texas Company's No. 6 State, Lake Barre.....Drlg. shale 2,250 ft.
The Texas Company's No. 10 State, Lake Barre.....Location.
The Texas Company's No. 11 State, Lake Barre.....Location.
The Texas Company's No. 12 State, Lake Barre.....Location.
The Texas Company's No. 13 State, Lake Barre.....Capping piling.
The Texas Company's No. 14 State, Lake Barre.....Location.

VERMILLION PARISH

Pure Oil Co.'s No. 1 Alliance Land, Sec. 34-11s-1w, 2,600 ft. N and 300 ft. E of SW cor. section.....Drlg. sticky shale 1,153 ft.

WEST FELICIANA PARISH

Putnam Syndicate's No. 2 Como Plantation, Sec. 51-1s-4w. Drlg. sandy shale 1,257 ft.

WILDCAT OPERATIONS IN OKLAHOMA

(Continued from Page 34)

McINTOSH COUNTY

Patterson et al's No. 1 Smith, SW cor. NW SE Sec. 32-9-16.....Fishing 5,687 ft.

MUSKOGEE COUNTY

H. E. Dowd's No. 1 Hembree, C NW NE Sec. 23-10-19..Drlg. 125 ft.
I. T. I. O.'s No. 1 Unknown, C SW NE Sec. 23-11-21....Sand 1,810-15 ft.; to test.
Rebold's No. 1 Miller, SE NE NE Sec. 32-13-19.....Rig.
Sioux Oil Co.'s No. 1 Unknown, NW SE Sec. 21-11-19....Shut down 1,011 ft.

OKFUSKEE COUNTY

E. L. Robinson's No. 1 Rice, NW Sec. 2-10-9.....Location.
Shepard et al's No. 1 Neveas, SE NW SW Sec. 3-12-10..Shut down 3,690 ft.

OKLAHOMA COUNTY

Citizens Oil Co.'s No. 1 Sage Barber, NE cor. Sec. 21-11-3w.....Shut down 1,200 ft.
L. C. Hivick's No. 1 Sunset Addition, NW SW NW Sec. 17-11-3w.....Shut down 5,515 ft.
J. F. Cuniff, trustee's No. 1 Church Land, NE NW SE Sec. 17-12-4w.....Shut down 6,700 ft.

PAWNEE COUNTY

Comar's No. 1 Babstick, SW SE SE Sec. 18-22-5.....Drlg. 400 ft.
Rookstool's No. 1 Wylie, NW NE SW Sec. 6-20-5.....Shut down 1,950 ft.
Sperry et al's No. 1 Mullrap, SE SW Sec. 2-22-5.....Drlg. 1,886 ft.
Cochran et al's No. 1 Green, NE cor. SW Sec. 15-23-5....Rig.

PITTSBURG COUNTY

J. Morrison's No. 1 Fowler, NE SE Sec. 13-7-17.....Rig.
C. Kennedy's No. 1 Travis, C SW NE Sec. 15-7-14.....Rig.
C. Canady's No. 1 Jones, NW cor. Sec. 14-8-14.....Rig.

POTTAWATOMIE COUNTY

Droppleman et al's No. 1 Jones, SE NW Sec. 21-8-3....Drlg. 4,715 ft.
Sinclair Oil & Gas Co.'s No. 1 Howell, C SW SW Sec. 14-26-24w.....20,000,000 ft. gas 5,350-5,400 ft.; total depth 8,539 ft.; shut down; sprayed 50 bbls. gasoline.

ROGER MILLS COUNTY

Ute Oil Co.'s No. 1 Williams, C SW Sec. 23-12-24w.....Drlg. 4,520 ft.
L. C. Hivick's No. 1 Davis, C NW NE Sec. 4-11-26w....Fishing 2,956 ft.

SEMINOLE COUNTY

Sunray Oil Co.'s No. 1 Sunray, NW SE Sec. 35-5-5.....Location.

STEPHENS COUNTY

Ross Southerd's No. 1 McKinney, NE cor. Sec. 25-1-8w..Shut down 1,062 ft.

WASHITA COUNTY

Cooper & Terhune's No. 1 Blocker, NW cor. Sec. 29-8-19w. Drlg. 1,845 ft.
Burns & Prince's No. 1 Deck, SW cor. Sec. 21-8-18.....Shut down 1,050 ft.
Petroleum Holdings, Inc.'s No. 1 Music, NW cor. Sec. 10-9-20w.....Shut down 280 ft.

WOODWARD COUNTY

Prairie Oil & Gas Co. et al's No. 1 Wilbur, NE cor. NW Sec. 22-23-17w.....Shut down 7,445 ft.

OKLAHOMA PANHANDLE

TEXAS COUNTY

Three Way Oil Co.'s No. 1 Crane, SW NW Sec. 11-1-1E..Shut down 4,625 ft.
Palo Alto Oil Co.'s No. 1 Graves, NE SW SW Sec. 23-2-18e.....Spudded; shut down.

SOUTHERN OKLAHOMA

ATOKA COUNTY

R. P. Whelan et al's No. 1 Howard, NW SE NW Sec. 6-4s-11.....Drlg. 300 ft.
Brookshire's No. 1 R. W. Rowland, NW NE SE Sec. 18-3s-10.....Shut down 400 ft.

BRYAN COUNTY

Bryan County Oil's No. 1 Childs, NW SE SW Sec. 7-7-10..T. D. 650 ft.
Bush et al's No. 1 Commerce Trust, NE cor. Sec. 35-6s-9.....Shut down 714 ft.
Johnson et al's No. 1 Ussery, SE SW SE Sec. 14-16s-7e..Shut down 485 ft.

JEFFERSON COUNTY

Chenault et al's No. 1 Grogan, NE SW NW Sec. 23-7s-6w.....Abandoned 1,801 ft.
Smith's No. 1 McCarty, SE NW NE Sec. 18-4s-8w.....Location.
C. V. Chenault et al's No. 1 Grogan, SW NE SE Sec. 15-7s-6w.....Location.

LOVE COUNTY

Batson & Sterrette's No. 1 Dillard, SE NE NW Sec. 25-6s-3.....Show 5 bbls. 1,585-96 ft.; T. D. 4,433 ft.; P. B. to 1,604 ft.
Holmes et al's No. 1 Flannigan, NW cor. Sec. 2-8s-1....Rig.

McCURTAIN COUNTY

The Oil Journal's No. 1 Parks, C NE NW Sec. 9-6s-23..Rig.
Stewart's No. 1 Patterson, C SE SE Sec. 7-6s-24.....T. D. 300 ft.; underreaming.

MARSHALL COUNTY

McCrory et al's No. 1 Little, NW SW Sec. 30-7s-6.....Shut down 497 ft.; showing oil; recementing.
D. H. Curry's No. 1 Ward, NE SE SW Sec. 15-5s-6.....Drlg. 2,060 ft.

STEPHENS COUNTY

Obermyer et al's No. 1 Skelton, NE SW SW Sec. 32-15-7w.....Shut down 1,582 ft.

WILDCAT OPERATIONS IN KANSAS

(Continued from Page 36)

MORTON COUNTY

Hydraulic Oil Co.'s No. 1 State Land, NW SE Sec. 22-34-43w.....Fishing 5-in. csg. 3,460 ft.

MORRIS COUNTY

Urschel et al's No. 1 Bersuch, NW SE NW Sec. 10-17-7..Machine.
Hankerson et al's No. 1 Cessman, SW SE Sec. 24-16-9....Shut down 2,210 ft.

NESS COUNTY

Gypsy Oil Co.'s No. 1 Coleman, C SW NE Sec. 25-17-25w..Fishing 4,690 ft.

NORTON COUNTY

Richards et al's No. 1 Colby, Sec. 17-4-21w.....Rig.

OSAGE COUNTY

Briggs & Smith's No. 1 Wood, SE NW Sec. 21-14-15.....Shut down 1,525 ft.
Fields' No. 1 Usker, SE cor. Sec. 35-16-17.....Shut down 400 ft.

RAWLINS COUNTY

J. G. Durham et al's No. 1 Weaver, SE cor. Sec. 3-2-35w.....Shut down 2,700 ft.

RICE COUNTY

Detrick & Langston's No. 1 Purcell, NW cor. Sec. 33-19-9w.....Shut down 1,100 ft.
McFadden and Shell's No. 1 Jennings, SW NE NW Sec. 29-18-6w.....T. D. 1,450 ft.; plugging back to 1,130 ft.
Cress et al's No. 1 Sharp, SE NE Sec. 13-20-10w.....Show oil 3,107-15 ft.; Siliceous 3,330-36 ft.; estimated 1,500 bbls.; shut in.
Allison-Fitzwilliams' No. 1 Blake, NE NW Sec. 9-18-10w. Rig.

RENO COUNTY

Shell Continental's No. 1 Blake, SW SE SE Sec. 23-23-4w. Chat 3,267-3,308 ft.; 8,500,000 ft. gas; shut in.

ROOKS COUNTY

Empire Oil & Ref. Co.'s No. 1 Halsman, SW NE SE Sec. 17-7-20w.....Drlg. 2,825 ft.

RUSH COUNTY

Dewey & Mitchell's No. 1 Greenawalt, C SW Sec. 17-19-16w.....Drlg. 2,430 ft.

RUSSELL COUNTY

Hall et al's No. 1 Mills, SE SW SE Sec. 30-14-13w.....Drlg. 2,630 ft.
Agate Oil & Gas Co.'s No. 1 Rochfellow, SE cor. Sec. 6-13-12w.....Shut down 3,374 ft.
Gilbreath et al's No. 1 Bratton, C NE Sec. 33-11-13w ...Drlg. 2,927 ft.

SEDGWICK COUNTY

Buck et al's No. 1 McNananan, NE NW NW Sec. 2-29-1..Shut down 2,440 ft.

SALINE COUNTY

Stanolind Oil & Gas Co.'s No. 1 Martin Com., NE SE SE Sec. 3-16-3w.....Underreaming 2,500 ft.
Twin Mounds Oil Co.'s No. 1 Weis, C W half NE NW Sec. 20-13-4w.....Shut down 2,700 ft.

SHERIDAN COUNTY

Flo et al's No. 1 Shoemaker, SE SW SW Sec. 27-7-26w..Shut down 1,610 ft.

STAFFORD COUNTY

Rosenthal, Stanolind and Amerada's No. 1 Gray, C NE Sec. 11-24-13w.....Drlg. 630 ft.

SUMNER COUNTY

Spencer et al's No. 1 Porter, NE SW Sec. 12-33-4w.....Rig.
Ostot et al's No. 2 Marlow, C SE NW SE Sec. 22-33-3w..Drlg. 725 ft.

WASHINGTON COUNTY

Sincox et al's No. 1 Penwell, NW SE NE Sec. 16-3-3....Shut down 1,720 ft.

CANADIAN FIELDS

(Continued from Page 69)

is handling the drilling contract on the Keho well, standard tools being used. For some months prior to the strike the test was fighting caving formations, and has been twice cemented back. Other companies holding acreage in the same general area include the Nordon Corp., of which Glen M. Ruby is president; Texas Oil Co. of Canada, and Vulcan Oils, Ltd., of Calgary.

Turner Valley

In the Central Turner Valley area, Richfield Petroleums' No. 2, LSD 12-13, Section 13-20-3w5, looks like the next crude naphtha producer. The well is drilling below 4,922 feet, about 195 feet in the lime, after encountering a second gas flow which raised the production to 3,000,000 feet.

Further south, Illinois-Alberta Oils' No. 1, LSD 14, Section 12-20-3w5, is still clearing after a shot and making a heavy flow of wet gas. Production test will be started as soon as the hole is clear of rock fragments. Potential crude naphtha recovery is estimated between 85 and 100 bbls. British Dominion Oil & Development Corp.'s No. 3, LSD 6, is being shot between 5,300 and 5,400 feet, after drilling 342 feet into the lime. Small gas flows, aggregating 3,000,000 feet, were encountered in a series of porous sands.

In the South Turner Valley, East Crest Oil Co.'s No. 3, LSD 4, Section 16-19-2w5, is drilling 285 feet in the lime at 4,734 feet, with a strong flow of wet gas, and appears to be close to the main producing horizon. No. 3 at this depth shows 10,000,000 feet of gas against 8,000,000 feet encountered in the same horizon in No. 2-A, which was a large producer, with intial recovery more than 450 bbls. a day.

In Section 4-19-2w5, Mercury Oils' No. 6, LSD 12, is drilling at 1,385 feet, after running casing. This is the only Mercury test now drilling, though Nos. 1, 2 and 3 are reported making an aggregate of 750 bbls. a day.

Alberta Superior Oils' No. 1, LSD 5, Section 21-19-2w5, is reported preparing to resume at 65 feet after a lengthy shutdown. Completion of the well is being financed by K. D. Johnson & Co. of New York, who are reported interested in a carbon black project utilizing waste gas, and the test will be carried to the lime horizon. The well is north of the East Crest acreage and east of the Home wells, in a section previously untested. Alberta Superior Oils, Ltd., was organized some years ago by Calgary and Edmonton interests, the directors including: Dr. W. E. Spankie, W. Pearson, J. J. Bowlen and A. C. McDougall of Calgary, and Col. G. B. McLeod, W. W. Prevey, A. M. McGavin and J. V. Bell of Edmonton.

In South Turner Valley Lowery Petroleums' No. 2, NW Section 17-19-2w5, is drilling at 6,297 feet, being the deepest active test in the field.

Royalite Meeting

Royalite Oil Co. at its shareholders meeting at Calgary recently re-elected the following directors: President, J. H. McLeod; vice president, Alexander Hannah; chairman of the board, A. M. McQueen; directors, A. E. Cross, C. M. Moore. Dalhousie Oil Co. shareholders

re-elected: President, A. M. McQueen; vice president, Alexander Hannah; managing director, J. H. McLeod; directors, A. C. Newton and N. J. Christie. Both companies are subsidiaries of Imperial Oil Co., Ltd., operating in the Turner Valley Field, though neither company is at present carrying on drilling on its own acreage. No announcement was made as to the future drilling program of either company, but shareholders of the Dalhousie company approved a proposal to relieve Mid-West Oil Co. of certain obligations conditional on the Mid-West company drilling a test on its acreage in the Turner Valley Field.

Shareholders of Sterling-Pacific Oil Co. met at Vancouver, B. C., when the following officers were elected: President, W. J. Blake Wilson; vice president, George S. Harrison; secretary-treasurer, W. W. Boultbee; managing director, Austin C. Taylor; directors, Dr. Lyall Hodgins, Frank D. Lundy and Neil McQueen. The company holds acreage, with one producing well, in South Turner Valley.

In the Grassy Lake area, the McPherson Syndicate of Regina, Saskatchewan, is reported drilling structure tests west of Grassy Lake in SW Section 17-10-34w4.

Test Near Oyen

In the Acadia Valley, some 13 miles from Oyen, Fuego Oil Co. is reported preparing to drill No. 2 test this spring. Development work was started by the Fuego company several years ago following a report by English geologists. The company secured 10,600 acres on the Acadia Valley structure, approximately 180 miles east of Turner Valley. Fuego's No. 1, NE Section 34-25-4w4, was drilled to 3,135 feet when a strong gas flow, estimated as 20,000,000 feet, was encountered. Later, light crude came into the hole, and a potential production of 68 bbls. is claimed. Geologists have advised deepening 200 feet, but owing to drilling difficulties the well was reduced to a 4-inch hole, and it was decided to start No. 2 to test the lower horizon. No. 1 is shut in, pending the development of further production. Officers of the company are: President, E. G. Law, Toronto; vice president, Dr. H. B. Miner, Milwaukee; managing director, A. O. McArthur, Oyen; directors, Miss Agnes McPhail, Owen Sound, Ontario; Mrs. Margaret McGregor, Oyen.

Hylo Oils Operations

Shareholders of Hylo Oils, Ltd., met recently at Calgary when the following directors were elected: S. H. Adams, Albert Johnson, L. A. Snyder, G. K. Tilley, O. L. Reinecke, R. J. Gathergood, D. P. McDonald, L. L. Thompson. Proposals have been made for completion of Hylo's No. 1, LSD 12, Section 4-19-2w5, in South Turner Valley, and the test will probably resume this spring. It has been standing at 2,000 feet with 16⅜-inch pipe set at 1,780 feet, and is close to the Mercury producers. The company has acreage in the Moose Mountain and Ribstone areas, and is reported securing acreage in the St. Lawrence Valley in Quebec province.

Red Coulee Field

On the Alberta end of the Red Coulee structure, Southern Alberta Exploration Co.'s No. 2, Section 3-1-16w4, is drilling below 1,700 feet. Vanalta Oils, Ltd., of Vancouver is reported arranging with J. W. Elliott for further drilling on its acreage.

In Montana, Scottish United Petroleums, Ltd., of Vancouver, has taken over acreage and well of Vantana Oil Co. on the west side of the Kevin-Sunburst Field. This test was drilled to 1,500 feet by Vantana Oil Co. and continued to 1,650 feet by Mark Hunt and associates of Ketchikan, Alaska; at this depth a flow of high grade crude was reported, though no estimate has been given. Scottish United has taken over the well and 40 acres, and is negotiating for 80 acres additional. Location is in Section 27-35-3w.

Pincher Creek District

In the Pincher Creek district, southern foothills, Alberta Gas & Fuel Co.'s No. 1 Yarrow, LSD 16, Section 34-3-30w4, is in the Kootenays at 4,300 feet and is fishing for lost bailer. The test is reported to have encountered some encouraging indications of oil and gas and will be carried deeper. The Alberta Gas & Fuel Co. has been carrying on extensive deep drilling operations since 1927. The company is a subsidiary of the Doherty interests, and commercial drilling was preceded by structure tests.

The Company's first well, No. 1 Waterton, was abandoned at 4,605 feet without a shot. A second test, No. 1 Castle, was abandoned at 3,310 feet, and a third, No. 1 Drywood, was carried to 4,095 feet and abandoned. Extensive surface tests were drilled at intervals, affording a great deal of information as to subsurface conditions in this section of the foothills. The drilling campaign is reported to represent an aggregate outlay of approximately $1,500,000, including, however, the company's half interest in a test drilled by the Hudson's Bay-Marland Co. near Champion, in the plains area of Alberta. While the deep tests so far completed have yielded no commercial production, they have furnished information which makes the outlook for commercial production in this area more favorable than thought some years ago. Alberta Gas & Fuel Co. hold some 80,000 acres. Lyn M. Farish, vice president, is in charge of Alberta operations.

Tests in the Foothills

In the Castor district, Hudson's Bay Oil & Gas Co.'s No. 1 Paintearth, LSD 5, Section 27-39-15w4, is drilling at 4,275 feet with 3,0000 feet of salt water in the hole.

Reports that Imperial Oil, Ltd. was interested in a proposed test in LSD 1, Section 20-9-2w5, on the Watson structure near Lundbreck are denied by Imperial officials.

In the plains area to the east, Inland Petroleums, Ltd., is carrying on structure tests on the Mowmac structure, south of Monarch, with H. M. B. Inglis in charge.

Ribstone Operations

In the Ribstone Field, eastern Alberta, deliveries of crude from the four producing wells to the Canadian Pacific Railway at Rivercourse are reported commencing. Meridian Oils' No. 1 on a two weeks' production test showed above 100 bbls. a day, and Meridian's Nos. 2 and 3 and Imperial Oil's No. 2 Ribstone gave satisfactory pumping production, with indications that Meridian's No. 3 may prove an exceptionally good well. Contract for hauling of the crude has been arranged at 23 cents a barrel for three months and thereafter 20 cents; and tank batteries have been erected in the field and at Rivercourse, the point of loading. It is reported engineers of the Canadian National Railways have been investigating a pipe line south from the field to Chauvin, their nearest shipping point.

Algonquin-Commonwealth's No. 2, LSD 5, Section 16-35-1w4, is rigging up with equipment moved from No. 1. Location is just north of Meridian's No. 3 producer.

It is reported that Margal Oils, Ltd., of Vancouver, which has production in the South Turner Valley and Wainwright Fields, is negotiating to take over and develop the acreage of London-Ribstone Oils, Ltd., in the Ribstone Field.

Montreal-Alberta Oils, Ltd., with A. Williamson as manager, is reported working on derrick on a location just west of Wainwright.

Manitoba Operations

In southwestern Manitoba, Commonwealth Petroleums' No. 2 test, LSD 2, Section 26-2-9WPM, near Manitou, is reported rigging up.

Further west, in the Turtle Mountain area, Turtle Mountain Royalties Syndicate has been organized to test operations between Melita and the international boundary. Reports made some years ago on this 18-mile strip were recently supplemented by investigation by J. O. Williams of Calgary, who will look after the operations. Besides Mr. Williams, Ernest O. Maze, J. B. Massander and W. J. Thompson are interested. The syndicate is primarily interested in securing commercial gas production. Mr. Williams' report indicates a possibility of gas in the Dakota horizon between 1,300 and 1,500 feet. Cable tools will be used for No. 1 test, which will spud in within a few weeks.

Ontario Drilling

In the Dawn Field, Lambton County, Ontario, Union Natural Gas Co.'s No. 58, SW, Lot 11, Concession 1, Dawn Township, is drilling around 1,050 feet. Union's No. 59, NW, Lot 24, Concession 2, is ready to spud in. In Tilbury East Township, Kent County, Southern Ontario Gas Co.'s test in SW, Lot 10, Concession 12, is drilling around 650 feet.

In Haldimand County, Union Natural Gas Co.'s No. 192, Lot 18, Concession 1, Walpole Township, has 21,000 feet of gas. Union's No. 194, Lot 22, Concession 7, Walpole, is drilling. Union's No. 195, Lot 8, Concession 5, Rainham Township, is drilling. In Norfolk County, Union's No. 193, Lot 17, Concession 5, Woodhouse Township, finished dry at 1,025 feet.

In the Petrolia-Enniskillen Field, Imperial Oil, Ltd., will close its receiving station at the east end of Petrolia on June 1, oil being received at the Blind Line station. Frank Yerkes, who recently returned from Trinidad fields, has bought the Smallman oil property at Petrolia.

Alberta Production Figures

While Turner Valley pipe line runs for March were 128,975 bbls., compared with 132,267 bbls. in February, official figures for all the Alberta fields indicate that actual production, including sales at the wells, was nearly 10,000 bbls. in excess of the February pipe line deliveries. The total for the entire province of Alberta in March was 149,784 bbls., as against 144,682 bbls. in February, and increases were shown in all fields. Detailed figures for March were: Turner Valley, naphtha, 140,217 bbls.; light crude, 2,146 bbls.; Red Coulee, light crude, 6,156 bbls.; Wainwright, heavy crude, 457 bbls.; Ribstone, heavy crude, 772 bbls.

Nova Scotia Test

In the province of Nova Scotia, Imperial Oil's No. 2 test near Amherst is reported at 1,130 feet and drilling satisfactorily.

SOUTHWEST TEXAS FIELDS

(Continued from Page 42)

All the tests shut down in Kerr County. In Real County Gant, Kilgore & Evans' No. 1 Auld made a little progress and set casing, and is now waiting on cement.

West of San Antonio

West of San Antonio in Maverick County and still in the Balcones fault zone the Texas Gas Utilities Co. has decided not to deepen No. 6 Chittim now at 5,590 feet and with some tools stuck in the hole. It was completed at 5,590 feet for 4,500,000 feet of gas which is pretty small for the depth. It was decided to deepen 10 feet and tools were run in but got stuck and are still there.

No. 8 Chittim is being started 24 feet from No. 7 which was lost and No. 8 will be the fifth test to be drilled close to the original discovery well in Survey 116. No. 1 Chittim, discovery well, was drilled to around 5,800 feet and at 5,565 feet made 28,000,000 feet of gas and considerable oil. There has been difficulty since in getting another test completed in that sand.

Two tests are getting started that will be watched closely after they get down a little. One is Camp and others' No. 1 Chevas in the southern part of Bexar County which is rigged up and should spud in early this week on a 7,500-acre block of leases belonging to the Humble Oil & Refining Co. The contract calls for another test to be started in a short time on the same block. The southern half of Bexar County lines up with the southern part of Guadalupe and the Luling, Darst Creek and Bruner Fields and these two tests are another effort to find Edwards lime production.

The other test will be the Camp & Stanolind in southern McMullen on the Murphy farm. One test has already been drilled in that area a little north of the structure tested out a few years ago by the Humble Oil & Refining Co. which drilled a lot of core tests on both sides of the McMullen-Duval County line. The first test was dry at 4,000 feet but encouraged the making of the new location.

SOUTHWEST TEXAS PRODUCTION

Agua Dulce	36
Bexar County	321
Branyon	21
Bruner	11 631
Buchanan	98
Chapman	3,978
Dale	272
Darst Creek	14,425
Goliad County	22
Kingsville	117
Larremore	21
Luling	8,709
Lytton Springs	722
Manford	130
McMullen County	17
Medina County	22
Minerva	404
Mirando district*	13,235
Pettus district	7,589
Saxet	361
Somerset	1,312
Thrall	25
White Point	49
Yoast	390
Total	67 636
Week ended May 2	70,308
Decrease	3,172

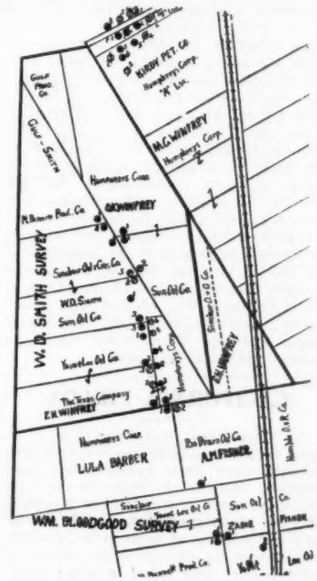
*Includes Charco-Redondo, Jennings and Mirando Valley, Zapata County; Albercas, Aviator, Carolina-Texas, Mid-O-Juelos, Schott and Wolcott, Webb County; Alworth, Henne-Winch-Fariss and Randado, Jim Hogg County; Cole, Driscoll, Kohler, Schoolfield-O'Byrne and S.R.C.-Vacuum, Duval County; Mount Lucas, Live Oak County.

GULF COAST FIELDS

(Continued from Page 39)

posite side of the Refugio 3,700-foot field from the present deep production.

The wells at Barbers Hill, a small one each at Saratoga, Batson and Goose Creek, comprised the only producing completions of the week on the Gulf Coast. Ten scattered operations were abandoned, being dry or testing salt water. Among these was Faust and associates' No. 5 Faust, southeast of the Nash Field, Brazoria County, which was quit at a total depth of 6,514 feet. It has been drilling since August, 1929. At Clay Creek, Sun Oil Co. has abandoned its No. 3 W. F. Schlottman in cap rock and at present there are no other operations drilling in that field. Federal Petroleum Co. has quit its second deep test flanking the Old Hackberry Dome, Cameron Parish, Louisiana, in shale at 5,602 feet; and at Bayou Blue, Standard Oil Co.'s No. 1 Baist was abandoned in salt at 3,861 feet. Humble Oil & Refining Co. has finally abandoned its No. 2 Cockrell-Moran, Lake Grand Ecaille, Plaquemines Parish, Louisiana, in salt at 5,861 feet, but it is rigging up for No. 4. The Texas Company's No. 5 L.L.&E., Four Isle Dome, Terrebonne Parish, was quit in salt at 1,507 feet. This test created con-



Map of west flank pool of Barbers Hill showing line fight which has resulted in the completion of a series of good wells which have increased Barbers Hill production to new peaks. At the bottom is the upper end of the southwest flank production and at the top is the lower portion of the northwest flank pool.

siderable interest several weeks ago because of strong sulphur showings in cap rock at 530-66 feet.

Failure at Lockport

In the new northwest extension district of Lockport, Calcasieu Parish, Louisiana, Vacuum Oil Co. chalked up a failure in its No. 7 State, west offset to Yount Lee Oil Co.'s No. 1 Miller, discovery well of that area. The well tested salt water with 1 joint of screen set at 6,567 feet. In addition to the Yount Lee discovery well, two other producers had been completed there, all from the 6,500-foot horizon, including the east offset and the south offset.

This area has been looked upon with much favor. The wells have proved more prolific and more consistent producers than in the main Lockport Field, a mile to the east, and in addition the oil has been of higher gravity and better quality. The salt water is not looked upon as the edge but rather of a spotted condition.

A Casing Record

Of interest in connection with Vacuum's No. 7 State is the fact that in it is the longest string of 9⅝-in. casing ever set in a Gulf Coast well, this string being set at 6,513 feet. Landing of the casing, however, was not entirely successful due to lightness of the rig. The bottom of the casing became frozen and when operators could not get circulation the attempt was made to bring in the well without cementing. Vacuum recently successfully set and cemented 6,498 feet of 9⅝-inch, 40-pound casing in its No. 9 Bordages in the same area and the east offset to the discovery well. That job set a depth record for successful landing of large pipe on the Gulf Coast.

Proration Meetings

Subcommittees of the Texas Gulf Coast proration advisory committee have been at work this week studying the production situation in the various districts with a view to working out some satisfactory plan for reducing daily production to the allowable figure of 140,000 bbls. set by the State Railroad Commission. The committee will get together May 12, 13 and 14 in this connection and for May 18 a general meeting of the entire advisory committee of 11 will meet at Houston to make recommendations for some action to co-operate with the Railroad Commission. The subcommittees are headed by R. H. Hargrove of the United Gas Co. for the Pettus and Refugio district; D. B. Harris, Humble Oil & Refining Co., central Gulf Coast district, and George Peddy, Humphreys Corp., southeast Texas coast, including Barbers Hill and that area.

CALIFORNIA FIELDS

(Continued from Page 45)

layed with mechanical trouble and consequently very little progress has been recorded. Both of the Superior Oil Co.'s drilling projects in this field at the present time made good footage during the week but neither of them is sufficiently deep enough to encounter the sand believed to have been found in this area.

Midway-Sunset

The Birch Oil Co. has focused the attention of operators on the Midway-Sunset Field of Kern County by logging what is reported to be a very promising oil sand in its No. 2 Mariocpa in Section 7-11-23. This hole, which has been cored very carefully, logged minor showings from 8,200 feet on but the sand became much more highly saturated just above the 9,000-foot level. The company is making preparations to land a 5¾-inch water string around the 8,200-foot level and an early test is contemplated. The General Petroleum has resumed drilling operations in its No. 1,301 in the Lost Hills Field of Kern County, the present formation at 2,225 feet being a sandy brown shale. The Universal Consolidated has material on ground for No. 17-D, a new well to be drilled at Lost Hills in Section 30-26-21, and rig construction is expected to get under way shortly. No. 49, the Universal's first well at Lost Hills, came in flowing 30,000 bbls. of salt water, when the water string was jarred lose and removed preparatory to a resumption of drilling. Drilling operations in the Belridge Field of Kern County indicate that it will be another several weeks before any additional tests are made to determine the productivity of the Temblor formation on properties adjacent to holdings of the Belridge Oil Co. The Union's initial completion in this district, No. 17 Belridge, in Section 36-27-20, is bolding fairly steady at 290 bbls. per day. The Mohawk Oil Co. ran into some water trouble in its No. 1 Wharton as this well came in flowing 1,000 bbls. of salt water from 5,825 feet, the hole having been plugged back from 6,150 feet. This project is one of several in the Weed Patch, or Mountain View Field of Kern County which are being watched to determine the extent and trend of the structure in this district. The Shell Oil Co. has cemented a string of 4½-inch in No. 1 Porter-Day, the discovery well, at 7,505 feet and a production test is to be made soon from 8,419 feet. The Shell is drilling two other holes in this field at the present time although its work is of an exploratory nature as it is not desirable to open up any additional fields at the present time. The General Petroleum is expected to complete No. 34 Heisen, a new well in the Mount Poso Field of Kern County within the next 15 days and will probably spud in Nos. 27 and 28 shortly thereafter. In the Round Mountain Field, the Chanslor-Canfield Midway Oil Co. is reaming No. 2 Mon preparatory to making a production test at 1,561 feet. This well, although carried in scout reports as being in the Round Mountain Field, is closer to the productive limits of Mount Poso and will undoubtedly be carried in that area if commercial production is secured. The Barnsdall has succeeded in recovering the fish which has been holding up progress in No. 1 Tognazzini, a wildcat on Gato Ridge in Santa Barbara County, and drilling has been resumed at 6,390 feet.

BIG RECORD IN PIPE LINE CONSTRUCTION

(Continued from Page 26)

ern Gas & Fuel Co. system in the Monroe Field of Louisiana. This development involved the securing of a gas supply in the Monroe Field and construction of what at that time was the longest large natural gas pipe line in the United States, consisting of 170 miles of 22-inch line from the Monroe Field to Baton Rouge, and approximately 100 miles of 18-inch line from Baton Rouge to New Orleans. Construction of this line represented a pioneering effort in the building of large natural gas lines through low, swampy country, the terrain in parts crossed by the line between Monroe and New Orleans being particularly difficult for construction work of this kind. Construction was commenced in May, 1926, and the line to Baton Rouge was finished in December of the same year. The line was continued on to the Pan American refinery at Destrehan, La., early in 1927, and shortly thereafter arrangements were made for the delivery of natural gas in New Orleans and the line extended the remaining 30 miles from Destrehan, natural gas service being inaugurated in New Orleans early in 1928. Ford, Bacon & Davis, Inc., has managed this entire system since completing its construction.

Denver Project

Late in 1927 the corporation was commissioned to design, build and operate a natural gas pipe line transmission system from the Amarillo Field in Texas to Pueblo and Denver, Colo. Construction began in November of that year and in June, 1928, natural gas was delivered to the distributing companies in Pueblo and Denver. The section of the line in Texas was built for the Canadian River Gas Co., a subsidiary of Southwestern Development Co. (controlled by Prairie Oil & Gas Co.), and the sections of the system in New Mexico and Colorado were built for the Colorado Interstate Gas Co. The entire system represented at that time the largest and longest natural gas transmission project in the world, and consisted of approximately 450 miles of line, about half of which was 22-inch pipe and the remainder largely 20-inch and 16-inch. The entire system has since been under the operating management of Ford, Bacon & Davis, Inc.

Great Southern Systems

Another large natural gas project was undertaken by Ford, Bacon & Davis, Inc., in 1928 when it was commissioned to construct a 210-mile transmission pipe line from the Monroe, La., Field to Memphis. This was an 18-inch line and represented approximately $6,000,000, including two large compressing stations, which

George W. Bacon
Chairman of the Board

the corporation also constructed. This project was completed in four months.

The next major project of the corporation was the 22 and 20-inch main pipe line system of the Southern Natural Gas Corp. running from the Monroe Field to Birmingham and Atlanta, together with lateral lines totaling in all some 800 miles of transmission line and representing an expenditure of about $25,000,000. Building of the main line was started in the early summer of 1929 and natural gas was delivered to industrial consumers in Birmingham in December of the same year, and in Atlanta in February, 1930. This system was managed by Ford, Bacon & Davis, Inc., until the end of 1930.

Texas-Chicago Line

In the summer of 1930, Ford, Bacon & Davis, Inc., contracted with the Continental Construction Corp. for a 140-mile section of that company's 24-inch natural gas pipe line extending from the Amarillo Field in Texas to Chicago. This line was the largest ever projected in the history of the natural gas industry, and was participated in by Cities Service Co., Insull & Son, Inc., Standard Oil Co. of New Jersey, The Texas Corporation, Columbian Carbon Co., Phillips Petroleum Co. and Skelly Oil Co., all of which are interested in Continental Construction Corp., organized as the vehicle for the planning and construction of the line. The first section contracted for by Ford, Bacon & Davis, Inc., was completed in January, 1931, and in March it received a contract for constructing the last 155 miles of the line across Illinois from the Mississippi River to a point near Joliet, Ill.

The activities of Ford, Bacon & Davis, Inc., in the construction of gasoline and crude oil transmission pipe lines have been more recent. In 1928 it built for the Canadian River Gas Co. one of the first gasoline lines in the United States, extending from a point near Channing, Tex., to a point near Amarillo. This line had a capacity of 25,000 gallons per day.

Last year it was commissioned by Phillips Pipe Line Co., a subsidiary of Phillips Petroleum Co., to supervise the construction of its gasoline pipe line running from the Texas Panhandle to East St. Louis, Ill. This line, which is of 8-inch pipe and approximately 1,000 miles in length, is now completed.

In March of this year, Ford, Bacon & Davis, Inc., was awarded a contract to construct for Arkansas Pipe Line Co., subsidiary of Arkansas Natural Gas Co., a 68-mile 8-inch crude oil pipe line from the new East Texas pool to refineries located near Shreveport. This contract was taken on a guarantee of completion in 45 calendar days and is now well toward completion.

Built Ajax Line

Another outstanding project participated in by Ford, Bacon & Davis engineers was the Ajax pipe line, built last year from a point near Tulsa to Wood River, Ill., by Standard Oil Co. of New Jersey. Ford, Bacon & Davis, Inc., directed the organization of this project, surveying the route and securing the rights of way.

Construction of the 22-inch natural gas pipe line of Mississippi River Fuel Corp. from the Monroe Field in Louisiana to St. Louis, Mo., and East St. Louis, Ill., in 1929 was another achievement of the corporation. This line, approximately 600 miles long, was completed in six months and has only been eclipsed in size in the Mid-Continent by the system of the Southern Natural Gas Co. and the Amarillo-Chicago natural gas pipe line now nearing completion.

In most of the pipe line projects undertaken by the corporation, field and line compressor stations have also been designed and constructed, while many have involved, in addition to engineering and construction, operating management as well.

One of the most recent projects in which the corporation has participated is now under way in the Southwest, where Ford, Bacon & Davis, Inc., is supervising the construction of an extension to the El Paso Natural Gas Co.'s pipe line system from a point near El Paso to Douglas and Bisbee, Ariz., and thence on to Cananea, Mexico. The line is of 12-inch pipe to Douglas, capable of working at 800 pounds pressure, and represents the latest development in the construction of natural gas transmission systems utilizing thin wall high-strength pipe. The line includes four main line compressor stations, totaling 8,800 horsepower.

Construction Subsidiary

Ford, Bacon & Davis, Inc., has recently announced the incorporation under the laws of New York State of the Ford, Bacon & Davis Construction Corp. to actively undertake all forms of oil and gas pipe lines and other major construction work. Edgar G. Hill is president of this wholly owned construction subsidiary, other officers being James F. Towers, George I. Rhodes and William von Phul, Jr., vice presidents, and Henry F. Storck, secretary and treasurer. Headquarters of the construction company are at Dallas, Tex.

The directors and officers of Ford, Bacon & Davis, Inc., are as follows:

Directors—George W. Bacon, George H. Davis, William von Phul, Charles F. Uebelacker, Charles N. Black, James A. Emery, James F. Towers, George I. Rhodes; Schuyler C. Stivers, and Edgar G. Hill.

Officers—George W. Bacon, chairman of the board; George H. Davis, chairman of executive committee; William von Phul, president; Charles N. Black, vice president; James A. Emery, vice president; James F. Towers, vice president; George I. Rhodes, vice president; Schuyler C. Stivers, vice president; Edgar G. Hill, vice president; Page Golsan, vice president; John E. Judson, vice president; Frederick W. Bacon, vice president, and Henry F. Storck, secretary and treasurer.

Besides its headquarters in New York, the corporation maintains offices at Chicago, Philadelphia, San Francisco, Cleveland and Dallas.

T. H. BURTON DIES

BUTLER, Pa., May 9.—T. H. Burton, aged 68 years, well known oil and gas producer in Butler County and a former merchant of Butler, died at his home after a lingering illness.

TWO IMPORTANT DATES
MAY 21 JUNE 4

On May 21 The Oil and Gas Journal will publish its *Natural Gasoline Manufacturers' Issue* which will feature the latest developments in natural gasoline practices. This issue will contain a survey of all companies engaged in this industry and their personnel.

On June 4 will be published the *Annual Pipe Line Number,* which is virtually a text book on pipe line practices, containing detailed maps of individual systems.

As a regular part of this issue will appear a Wall Map, 36"x48", showing the transcontinental oil, gasoline and natural gas lines in the United States. Additional copies of this map will be available to those desiring it at $1 per copy.

Despite the fact that additional copies are printed, we have never been able to meet the demand on us for copies of this issue. And so, if you are not a subscriber, and want to be sure of receiving it, we suggest that you enter your subscription on the coupon below and mail it to us.

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Chicago Price Trend Still Downward

Drastic Action May Be Imminent to Combat Inroads on Retail Markets. Discussion of Effect of Third Grade Fuel

By Robert C. Conine

CHICAGO, May 11.—Price trends in the refined petroleum markets in the Chicago district continued downward last week. The service station price situation is still the center of interest and many indications point to the possibility that drastic action is imminent on the part of several major companies to combat inroads made upon their retail markets by certain larger companies as well as the smaller operators.

Sinclair Refining Co. reduced the price of its green third-grade gasoline to 8 cents plus the 3-cent tax. The other larger companies had not met this cut Saturday, five days later, continuing to post the 8.25-cent price on this fuel. However, officials of the major interests assert that they are prepared to meet competition on any level if their gallonage is in any way encroached upon.

One marketer, who has more than 100 retail outlets in Chicago, is known to have brought down upon himself the wrath of several important competitors through a recently initiated policy of installing pumps at stations formerly served solely by these majors. An enormous increase in gallonage during April is reported by this marketer.

Tests on Three Grades

A better showing in the relation of characteristics of the second and third grades of gasoline can be reported for last week. Distillation, antiknock, gum and corrosion tests made upon the three grades of one of the major interests point to considerable improvement in the second or regular grade, especially in respect to octane number and endpoint. The test data is given in tabular form below:

	Third grade	Regular	Ethyl
Octane number	54	59	75
Gum (mg.)	5	20	6
Sulphur, per cent	.02	.02	.03
Gravity	61	61.3	63.3
Initial	105	99	104
5 per cent	130	128	125
10 per cent	150	146	141
20 per cent	180	178	175
50 per cent	260	264	240
90 per cent	372	370	336
Endpoint	415	395	379
Doctor	Neg.	Neg.	Neg.

Stanolind Blue has been reduced at Wichita, Kans., Detroit and St. Louis. The new service station prices on this gasoline are: Wichita, 8.8 cents, 1.0-cent cut; Detroit, 11.9 cents, 0.9-cent reduction, and St. Louis, 9.9 cents, 1.0-cent cut. Shell Petroleum Corp. continues to offer its regular grade at 1.0 cent above the Stanolind Blue market.

Phillips Petroleum Co. has not introduced a third grade in Chicago, although it is marketing this grade at St. Louis as Phil Blue. The regular grade of this company is offered at 11.0 cents, excluding the 3-cent tax. At the Chicago offices of this company no change in this policy is expected in May.

Effect on Regular Grade

No information has been available as to whether the introduction of a third grade by the larger companies has cut down the gallonage of their regular grade. As to the account the third grade is giving financially, an executive of one of the largest marketers of this motor fuel said that the company is "just breaking even on the third grade."

There is one thing certain, however, and that is that the filling station operators are not pushing the sale of the cheap gasoline. On the contrary, the automobilist has the unusual experience frequently now of hearing the man at the pump station that the gasoline inquired about, and which he is selling, the third grade, is "terrible stuff," hardly fit for a tractor. Distillation tests fail to support this type of filling station operator, and, while it is true that there is an increase in the number of disgusted automobile owners who drain poor fuel from their tanks, none of this practically worthless motor fuel is sold by the major marketers.

The fact that officials of the marketing companies assert that their cheap grade is "a good U. S. Motor specifications gasoline" which they expect to be satisfactory enough to hold customers attracted by the trackage station prices, would indicate that the filling station operator who "runs down" the third grade so fluently is doing so on his own theory that that is the way to keep up the gallonage of the regular grade.

The refiner seems to be the only one figuring in the casualty list. Several which have been doing business in this territory have been unable to stand by their contracts and have shut down their plants. The fact that two major companies have purchased 1,000 cars of gasoline to be delivered this month has not made the least impression on this market. One view of the market is cynically expressed in the statement that many marketers meet buying overtures with the question: "What do you want to buy and how much do you want to pay for it?"

Ruling Prices

Ruling price on U. S. Motor gasoline has dropped to 3 cents, basis Group 3, with a lot of material going at 2⅞ cents. The high is 3⅛ cents. The 3½-cent price posted by some of the companies may be ignored as these companies do not have gasoline to sell at any price, their business being with their own retail outlets. It is also significant that much more gasoline is being purchased by refiners, who feel it is more economical to buy than to manufacture the gasoline.

Events of the past week which should have been favorable to the refined products markets failed to find reflection in the price structure. The greatly lowered crude oil production witnessed in East Texas last week and the increased demand for gasoline appears to have made no impression. The low prices given here are to jobbers and not for resale. If not demoralized, the market is in such a condition the seller feels that no matter what he bids there will be someone with plenty of material who will go under his figure.

While it is an accepted fact that there can be no hope of improvement in the refined products markets until the price of crude oil recovers, some marketers and refiners are putting the much blamed producer in the background and are indulging in recriminations. The statement of the president of one of the largest oil companies in the territory last week diagnoses the illness of the petroleum industry thus: "The industry has 75 per cent more marketing facilities than it needs and 50 per cent more refining capacity than is warranted. Much of this material is obsolete and therefore uneconomical. While I most decidedly disclaim the role of Moses to the industry, I would urgently advise these branches of the business to return to a sane policy based on the law of supply and demand. In our own company we have torn out antiquated equipment and have kept our refinery plants up-to-date in every sense of the word. At times we have run at 50 per cent capacity to maintain a proper balance with the demand."

Tone More Hopeful

Little though the present situation may warrant it, there is a hopeful tone, probably rising from the expectation that crude oil curtailment and increased movement of gasoline will assert themselves belatedly to strengthen the market. However, the behavior of buyers, who are consistently refusing to purchase more material than for their immediate needs, is the telling factor in the damage which has been done to the price structure. At the same time it is reported that buyers are taking out their full commitments on contracts very satisfactorily.

With these refinery prices in mind it is not difficult to see how gasoline price cutters continue to hold their postings below those of the third-grade motor fuels offered by the larger companies. In fact, the trackage station operators are showing practically no signs of distress at this time. Those that are selling straightrun gasoline are obtaining as much of the fuel as they can use from Oklahoma and Texas refineries, and at a price which is very favorable. Other operators are enabled to sell motor fuel at 7 cents plus the 3-cent tax, or 1.25 cents below Stanolind Blue, because of the low natural gasoline markets. The 50-52 gravity, 437 endpoint naphtha used in manufacturing blended gasoline sells within a price range of 2⅞ and 3 cents. This range is narrow because of the large demand for this naphtha and the comparative scarcity of it. Prices of the natural gasolines added to this naphtha are: Grade A, 72-79.9, gravity, 375 endpoint and 90 per cent recovery, 1¾ cents; Grade AA, 80-87.9 gravity, 375 endpoint and 90 per cent recovery, 1½ cents; Grade BB, 84-92, gravity, 375 endpoint and 85 per cent recovery, 1⅜ cents.

To Hold Their Own

Officials of the major companies aver that they have no intention of driving the "little fellow" out of the oil business "just to keep all of the markets to ourselves." However, the larger interests do intend, the officials said, to hold their gallonage. The following is a statement of one executive:

"The cut-price operators have been cutting into our gallonage for a year and a half without us making a move to stop them. These operators have comparatively recently come into a field long occupied and faithfully served by us, so that it is not now a question of our taking gallonage that rightfully belongs to them. It is merely an attempt on our part to regain something that has been taken from us, or at least to stop these cut-rate sellers from making further inroads into our business.

"These price cutters have prospered and expanded. They have given no thought to the welfare of the industry at large. Their existence has been made possible by refiners whose only thoughts are to buy crude oil far below the market price and to get rid of the output of their plant at any price. These refiners exist because of those oil producers who have drilled frantically in the new flush areas to throw on the market such floods of oil that the price has fallen to unprecedented levels."

Lubricating Oils

There is an increased movement of bright stocks and neutrals to compounders.

Kerosene

Kerosene, like 437 endpoint naphtha, continues to hold a good position at 2⅜ cents to 2½ cents for the 41-43 water white, and 2⅝ cents to 2⅞ cents for the 42-44 water white.

Fuel Oil and Gas Oil

A downward revision has been made in the fuel oil and gas oil markets. Plenty of material is available at the prices given here, although these prices are generally 2½ cents below the postings of one of the largest marketers. Prices last week were: 18-22 fuel oil, per barrel, 35½ cents to 40½ cents; 22-26 fuel oil, per barrel, 42½ cents to 47½ cents; 28-30 fuel oil (zero), per barrel, 62½ cents to 67½ cents; 32-36 gas oil (industrial), 1 cent to 1¼ cents; 32-36 gas oil (zero), 1⅜ cents to 1⅝ cents; straw distillate, 38-40, 1⅝ cents to 2 cents.

SITUATION AS SEEN BY PRESIDENT TEAGLE

NEW YORK, May 9.—Production of gasoline is now without profit with prices as low as they are, according to Walter C. Teagle, president of the Standard Oil Co. of New Jersey, speaking at a meeting of the Bond Club of New Jersey at Newark. Mr. Teagle blamed the inability of the oil industry to control its crude oil production as the reason for the extremely low prices of the principal product.

The profit from gasoline sales goes to the State, Mr. Teagle declared. Of the present retail price of 14.7 cents a gallon in Newark, 3 cents goes to the State, 4 cents to the filling station, a half cent for railroad transportation, 2 cents for tank wagon transportation and 5.2 cents to the refinery, he stated.

"The oil industry is now going through a difficult process of adapting itself to a new set of conditions and a new basis of operations," Mr. Teagle said.

"It was engaged for so many years in a race to keep its crude supplies up to rapidly expanding needs that it got a momentum in this direction which now is proving a serious embarrassment.

"In most industries such as agriculture, or the manufacture of motor cars, excess capacity need not be used and supply can be regulated if producers so decide.

"The petroleum industry has been hampered by conditions inherent in the raw material and restrained by laws from making effective agreements for the limitation of drilling.

"Gasoline taxes, already abnormally high in relation to the price of the article taxed, but going higher each year in some states, are tolerated because the public has the benefit of cheap motor transportation.

"While the petroleum industry's problem of overproduction is difficult to solve, it must be credited with having already brought to an end the industry's too rapid expansion program and forced the adoption of more orderly and economical methods."

EMMONS NEW WORK

"Geology of Petroleum," second edition, by William Harvey Emmons, professor and head of department of geology and mineralogy, University of Minnesota, presents salient features of the leading oil fields of the world. The book has been almost completely rewritten and revised.

The book is intended to serve as a textbook, containing some 350 maps, cross sections and other illustrations as well as a very extensive bibliography. It is published by McGraw-Hill Book Co., New York City ($6).

Eastern Market in Unsettled Condition

Sweeping Reductions in Refined Products Prices During Week. Drastic Readjustment in Posted Quotations Looked For

By A. E. Mockler
New York Bureau, The Oil and Gas Journal, Rooms 1919-21, No. 154 Nassau Street

NEW YORK, May 11.—Sweeping reductions in refined products prices developed in the East Coast market during the week, and the market at present is in the most unsettled condition witnessed for some years past. While the eastern branch of the industry has been somewhat behind the remainder of the country in reaping the harvest of overproduction of crude, the reaction has now set in with full force, necessitating a general readjustment of market values and further seriously depreciating inventory values of holdings of principal companies.

Lower prices were named during the week on gasoline, kerosene, Diesel oil, gas oil, and lubricating oils, and on a number of products, including gasoline and kerosene, prices are far from steady at the new and lower posted levels.

Standard Oil Co. of New Jersey during the week announced a general reduction of one-half cent per gallon in tank wagon and service station gasoline prices throughout its territory, with the exception of Delaware, bringing the market in line with lower wholesale quotations now prevailing. Reductions in tank wagon and service station prices, and tank wagon kerosene prices, are looked for in New York and New England territory.

While major integrated companies have obviously been allowing the market to drift during the past few months, it is expected that leading interests will endeavor to restore some semblance of stability to gasoline markets for the summer motoring season, and a drastic readjustment of posted prices, to minimize the demoralizing effects of continued price cutting by small interests, would not come as a great surprise to the East Coast trade.

Refinery Gasoline

Widespread irregularity continues in the refinery gasoline market in the East, and prices are in nominal position. A number of refiners are now posting 6 cents per gallon for U. S. Motor in tank car lots at refinery terminals, with some sellers still quoting 6½ cents. Sales at 5¾ cents are by no means infrequent, however, and present indications are that the general market will shortly stabilize, temporarily at least, at the 6-cent level.

East Coast refiners are making substantial progress in cutting down their gasoline inventories, but holdings are still large, and keen selling pressure is still discernible in some sections of the market. Withdrawal of 838,000 bbls. of gasoline from storage at refineries in all parts of the country was reported for the week ending May 2. Of this reduction in refinery stocks, East Coast refiners accounted for more than half, holdings of gasoline at refineries in this area as of May 2 totaling 8,453,000 bbls., against 8,907,000 bbls. at the close of the previous month.

Movement of California, Gulf, and South American gasolines into East Coast markets has not shown any substantial aggregate gain during the past two weeks, so the current weakness in eastern selling prices appears to be the result of the action of some of the weaker holders in turning their inventories into cash, regardless of prices.

Consumption of motor fuel throughout the East has shown a material increase under the stimulus of the favorable weather of the past week, but notwithstanding the steadily increasing demand, jobbers are still inclined to hold down to hand-to-mouth buying operations, and there is a noticeable lack of confidence in the market outlook. Refiners are refraining from pressing for forward delivery contracts, under present conditions, and it is doubtful if marketers would be inclined to make any forward committments unless their contracts were surrounded with so many safeguards that the deal would be both unprofitable and uneconomic from the refiners' standpoint.

Present indications are that the coming summer months will witness more activity in eastern markets by small independent operators than for several years past. Marketing of low priced Gulf gasoline by these independents gives promise of becoming one of the outstanding features of the eastern gasoline market this season.

Tank Wagon Gasoline

Effective May 6, Standard Oil Co. of New Jersey reduced tank wagon and service station gasoline prices one-half cent per gallon throughout its territory, with the exception of Delaware, the lower prices being in line with the reduced quotations for tank car and cargo lots at principal East Coast marketing points. Other marketers operating in "Jersey territory" followed in the reductions.

No change in the "official" posted schedules in New York and New England territory was made during the week, but with wholesale markets sagging steadily, considerable price cutting in tank wagon sales have developed, and this is naturally carried out in service station prices, with the result that the entire price structure in this territory is in chaos.

While marketers are optimistic regarding the prospects for improvement during the summer months, the outlook at present is not very promising.

Kerosene

A general reduction of one-half cent per gallon in 41-43 water white kerosene developed during the week, and although the posted price remains at 5¾ cents per gallon, in tank car lots at refineries, the general going price is 5¼ cents, with relative little business passing.

Tank wagon demand for kerosene is rather spotty, with posted prices unchanged throughout the territory on the part of major marketers. Some price cutting is reported by the smaller marketing interests, however, and a general cut of 1 cent per gallon in posted prices would not come as a surprise.

Gas Oil

A further drop in the posted price for 28 plus recycled gas oil last week brought the market down to the basis of 4 cents per gallon, in tank car lots, at New York harbor termnial refineres. This latest reduction, effective May 5, represents a decline of 1¼ cents per gallon in the posted figure within a week's time, but actually carries the market but one-quarter to one-half cent per gallon under the figures at which most of the recent business has been passing.

Demand for gas oil has been lagging in the local market, and with the season of lightest consumption now at hand, refiners and marketers do not look for much activity in this branch of the trade for several months to come.

Marketers are expected to contract for delivery next fall in substantial quantities, however, gas oil at 4 cents presenting many attractive possibilities for distributors of oils for domestic heating installations.

Utility consumers in the eastern area are not stocking gas oil ahead of requirements to any material extent, and week-to-week covering appears to be the order of the day.

Diesel Oil

The feature of the week's market was the reduction of 10 cents per barrel in posted prices at principal North Atlantic ports, bringing the market down to $1.65 per barrel. Posted quotations at other points have not yet been revised, but it is expected that the market at Gulf ports and other points will likewise be lowered in line with the reduced price basis in effect here.

Demand for Diesel oil has been steadily widening locally, and the latest price reduction was made to readjust the market to lower producing costs, incidental to cheaper crude petroleum, rather than in an effort to stimulate demand.

Fuel Oil

Bunker "C" oil is meeting with a good demand at eastern ports, and the market appears to be fairly stable at the recently reduced quotation of 95 cents per barrel, in bulk, f.o.b. refinery terminals.

While considerable quantities of cheap bunker oil are available at California and Gulf ports, the low basis prevailing at eastern refineries does not offer many attractive possibilities for the dumping of distressed bunker oil from other refining areas in Atlantic Seaboard markets.

Stocks of gas and fuel oils at East Coast refineries showed a substantial gain during the week ended May 2, totaling 8,027,000 bbls. on that date, as compared with 7,730,000 bbls. at the close of the previous week.

Lubs

Inquiry for prompt shipment cylinder stocks showed some improvement during the week, but the market is still in easy position, reflecting the low crude market and continued sharp selling competition. Bright stocks firmed up a trifle during the period, with the dark a half cent higher at 24 to 25 cents per gallon, but the remainder of the market was weak. Spot 650 steam refined was quoted a half cent lower at a range of 19 to 20 cents per gallon, with 630 Pennsylvania flash down one-quarter cent at 25¾ to 26 cents per gallon. The market for Warren 600 E was off a half cent at 19½ cents, with Oil City E showing a similar reduction at 18½ cents per gallon. Refiners are making some progress in cutting down their surplus holdings of lub oils, and are holding production at curtailed levels.

Prices for red and pale oils were maintained at unchanged levels throughout the week, with a fair volume of business reported during the period.

Wax

An irregular tone predominated in the wax market during the week, and small lot trading continued to predominate. Export demand was again lagging, and the market tone was soft, with quotations susceptible to shading on some grades.

Domestic consumers are expected back into the market for stocks in fairly substantial volume during the current quarter. Buying by manufacturing consumers has been materially under normal for some weeks past, and it is believed that these buyers have practically no reserve stocks on hand, and will be forced back into the market to cover spot requirements shortly.

Export Market

The only development in the Gulf market during the week was an inquiry for a 5,000-ton cargo of 64-66 gaosline for end of May or early June shipment to France, with indications that a London firm, which has been active in the Mid-Continent export market during the past few years, would handle the business.

The Gulf export market is entirely nominal as to price, and leading export sellers are quoting only on direct inquiry. Nominal quotations this week show declines on both gasoline and kerosene, and are as follows: 58-60, U. S. Motor, 4¼ cents; 60-62, 400 endpoint, 4½ cents; 61-63, 390 endpoint, and 64-66, 375 endpoint, 5 cents; prime white kerosene, 4 cents; water white kerosene, 5 cents.

Inquiry for domestic crude for later shipment to France continues, but buyers' price views are substantially under even the low prices at which East Texas sellers are willing to make committments, and relatively little actual business has been booked as yet. American representatives of French interests are urging early closing of contracts, believing that the longer their foreign principals hold off, the more they will have to pay for crude.

No activity in either Venezuelan or Mexican crude was reported locally during the week.

Petroleum Exports

A slight easing-off in export shipments of refined petroleum products through the local port was reported during the week ended May 2, volume falling off on a number of products.

The following table shows principal exports of refined petroleum products from New York for the past three weeks (all figures in gallons unless otherwise noted):

	Week ended		
	May 2	Apr. 25	Apr. 18
Gasoline	10,000	330,000	195,000
Naphtha	275,000	75,000	145,000
Kerosene	20,000	15,000	140,000
Fuel oil	5,000	5,000	295,000
Lubricating oil	2,360,000	2,125,000	2,960,000
Petroleum, ref.	495,000	410,000	960,000
	Pounds		
Petrolatum	260,000	200,000	12,000
Paraffin wax	1,500,000	2,375,000	2,165,000
Refined	550,000	740,000	100,000
Scale	110,000	1,320,000	430,000
Lubricating grease	425,000	850,000	750,000

French demand for American refined products, gasoline and lubricating oils in particular, will be seriously affected by the building up of the refining industry in France. A number of new refineries will be completed and go into operation within the next year, and by the latter part of 1934 French refineries capable of handling a large part of domestic consumption requirements will be in operation. A number of American companies whose operations in France have been carried on in a large way during recent years are building refineries in that country to supply their French marketing subsidiaries, but small independent American refining interests, which have previously marketed part of their output with French distributors, will be forced to seek new outlets when the French refinery construction program is completed.

Imports

Imports of crude and refined petroleum at the principal United States ports for the week ended May 2 totaled 1,720,000 bbls., a daily average of 245,714 bbls., as compared with 1,263,000 bbls., a daily average of 180,429 bbls. for the previous week, and a daily average of 221,966 bbls. for the month of April and 246,774 bbls. daily for the month of March. Details follow:

	Bbls. of 42 gals.
At Atlantic Coast ports—	
Baltimore	330,000
New York	1,002,000
Philadelphia	342,000
Others	46,000
Total	1,720,000
Daily average	245,714
At Gulf Coast ports—	
All ports	None
At Atlantic and Gulf Coast ports—	
Total	1,720,000
Daily average	245,714

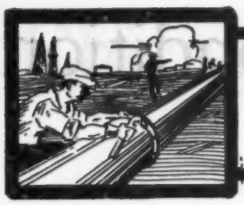
Distribution of total imports is as follows:

Crude	1,032,000
Gasoline	278,000
Fuel oil	410,000

California Oil Receipts

Receipts of California crude and re-

(Continued on Page 138)



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Attention: Mr. A. A. Buschow. LD-59.

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100 OIL and gas engines for sale. Superior, Reid, Franklin, Foos, Black Bear and Primm 15 to 80 H.P. in fine order; new models, low prices. Edward A. Schambs, Jr., Box 868, Wichita Falls, Tex. Phone 6356.

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Mid-Continent Oil Companies
Official Clearing House

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FOR SALE: Are offering a limited amount of good used rotary equipment, cable tools of all kind, gas or oil pumping engines, boilers and all sizes of drill pipe. Available for immediate delivery at several points throughout the oil fields. It will pay you to figure with one of the Bridgeport Stores for this class of material.
THE BRIDGEPORT MACHINE COMPANY,
WICHITA, KANSAS
Branches Throughout the Oil Fields.

FOR SALE—EQUIPMENT

FOR SALE: Good used seamless casing, line pipe, good used drill pipe, available at several places throughout the Mid-Continent Oil Fields.
THE BRIDGEPORT MACHINE COMPANY,
WICHITA, KANSAS
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Four 10,000-gals. tank cars coiled. 50 ton trucks. Victor Car line, 111 West Jackson Blvd., Chicago, Ill.

FOR SALE — Slightly used Ingersoll-Rand steam two stage, 250-pound air compressor. Piston displacement. 312 cubic feet per minute at 200 r.p.m. Complete with intercooler and receiver. Write Box E-456, The Oil and Gas Journal, Tulsa, Okla.

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Wanted—Leases, royalties and production in shallow drilling areas, Oklahoma and Kansas. Must have maps, all data first letter. Name lowest price and terms. Forming large royalty and lease company. Need few more parties invest from $500 to $5,000 to become directors, form foundation. Then we have large financial house that will list our securities. Exchange raise plenty finances. Our plan safe. Will drill no wells. Address M. Wilson, 6357 Stewart Ave., Chicago, Ill., for information.

HAVE splendid drilling block near discovery well Hidalgo County, Southwest Texas. Geological and magnetometer reports on file. Well to be started immediately. Excellent possibilities. Limited portion this lease can be purchased at $25 per acre. Quick action necessary. American Petroleum Engineering Co., 1129 Fidelity Bldg., Los Angeles, Calif.

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Settled production 790 acres, three producing oil and gas wells making 30 bbls. daily. Wells need cleaning. Should produce 125 bbls. daily and 5,000,000 cubic feet gas. Complete refinery, three drilling rigs, all equipment necessary for operation of lease. Deeper sands have never been tested. Excellent geology. Maps, pictures and complete inventory. Full seven-eighths lease for quick sale. $25,000. American Petroleum Engineering Co., 1129 Fidelity Bldg., Los Angeles, Calif.

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List your surplus with us.
And advise us of your needs.
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JOBERT OIL DRILLING COMPANY offers fifty divided assignments interest nonassessable in drilling well on forty acre lease, mile and half from production Kilgore, Texas. Interest money back from first oil runs before company receives a cent. One thousand dollars per. Send money to Citizens Bank or 300 South Saunders St., Tyler, Texas. No stock or units but ownership interest. Total interest in seven-eighths lease one hundred. Jobert Petroleum Company, 300 South Saunders, Tyler, Texas.

COMPLETE SKIMMING PLANT located at Denison, Texas, for rent, sale, or will operate on partnership basis with experienced refineryman. Don't write, wire E. S. Lacey, Denison, Texas.

AGENCY WANTED

An organization, established in 1895, located in New York City and having a wide acquaintance both here and abroad is prepared to negotiate with manufacturers for the purpose of promoting their Eastern and Foreign sales. Firms who seek relief from the burden of maintaining a combined New York City office and Export Department will find it to their advantage to investigate. Write Box E-487, The Oil and Gas Journal, Tulsa, Okla.

CONCERNS Willing to pay thousands of dollars for useful patents. Send $1 for list of things to invent and start on the road to fortune. A. T. Downing, 18 Greenough Ave., Boston, Mass.

Have several thousand acres in the great Fort Morgan Field (Colorado) close to production. Want drilling proposition. Ed Rikhoff, 1284 Downing St., Denver, Colo.

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22 acres, one well making 3 bbls. daily, for quick sale $1,200.00; equipment cost $1,000.00 production 580 feet.
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GRAHAM, TEXAS.

OIL located before drilling. Geophysical method. Toggodometer Instrument; take pay in oil. No oil, no pay, except traveling and testing expenses, 95 per cent accuracy. O. P. Coffin, Caddo, Tex.

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$12.50 BUYS DEED part oil, 2 Oil Royalties City Pool. Ed Milam, Dept P., Oklahoma City, Okla.

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FINANCE YOUR OWN project with shares bonded. Quickest, most satisfactory known method of raising capital. Information free. Bankers Interstate Security, Electric Bldg., Denver, Colo.

IF YOU WANT your securities or proposition intelligently submitted to underwriting and security selling houses in New York, write W. W. Hines, Room 803, 150 Broadway, New York City.

CAPITAL: An exp. dependable broker will aid in financing projects of merit. Amster Leonard, East Orange, N. J.

SOUND PROPOSITIONS seeking capital for development or expansion send details. S. I. C., 82 Wall Street, New York City, N. Y.

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ROYALTY UNDER DRILLING WELL offsetting production in Ritz Canton area, Kansas. Assignment in lease and well to be drilled Gregg County, Texas, close up territory to big wells. Royalties in Stafford County, Kansas, Ellsworth Arch excellent geology. Stevens County, Kansas, gas royalty. Others in Gregg, Rusk, Smith, Hopkins, Franklin, Cherokee, Upshur Counties, East Texas. James R. Haynes, Grantville, Kansas.

ECTOR Co. ROYALTY joining Gulf block, few miles of new Rector, Ward Co. well between it and Penn pool and near Wurtz well. Part cash. Anderson, Linz Bldg., Dallas, Texas.

ROYALTIES—PRODUCTION

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THE OIL AND GAS JOURNAL
TULSA OKLAHOMA

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WANTED: Experienced man to handle oil and gas leases and take charge of Lease Exchange in new field. Must be able to furnish the best of references. State experience and reference first letter. Box 182, Williamsport, Penna.

WANTED: Salesmen and Sales Organizations to sell acreage proposition in Tioga Field. Fast selling proposition, must be reliable and furnish reference first letter. Address Tioga Realty & Development Company, Williamsport, Pa.

WANTED MEN WHO ARE NOW EMPLOYED in the oil industry to solicit subscriptions for a reliable publication. Liberal commissions. Write Box E-475, The Oil and Gas Journal, Tulsa, Okla.

WANTED: Experienced oil well driller to take a job by the foot in Northern Wisconsin. Material adaptable for churn drilling and rig on the ground now. Want to drill about 1,000 feet as quickly as possible. Address F. E. Taylor, President, Northern Gas and Oil Co., Merrill, Wisconsin.

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TO REFINERS without engineering departments. A service is now made available whereby you can at all times have the services of a competent refinery engineer and drafting force. A small monthly retainer fee and the actual cost of the preparation of drawings, requisitions, etc. Will handle anything from small alterations to the building of a complete refinery. For further information write to Box E-480, The Oil and Gas Journal, Tulsa, Okla.

PETROLEUM CHEMIST with six years experience in complete oil refining. Gas analysis and knock testing. Available June 10th. Write Box E-485, The Oil and Gas Journal, Tulsa, Okla.

YOUNG man with refinery, time keeping and pay roll experience wishes permanent connection with oil company offering future in accounting. C. E. Terry, 422 S. Fredonia St., Longview, Tex.

TURN TO PAGE 126 FOR ADDITIONAL CLASSIFIED ADS.

CLASSIFIED WANTS

Read by Oil Men Everywhere

(Continued from Page 125)

POSITIONS WANTED

PETROLEUM CHEMIST, M. A. & B. S. in Chemical Engineering, with 11 years' experience in refining as chief chemist and as assistant superintendent and advisor capacity to sales department, wishes to secure responsible position with reliable company. Excellent references. Write Box E-408, The Oil and Gas Journal, Tulsa, Okla.

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DESIRE CONNECTION with producer who would be in a position to furnish 1,500 bbls. of high-gravity, Mid-Continent crude per day, also to take financial interest in Canadian refinery. Answer Box E-424, The Oil and Gas Journal, Tulsa, Okla.

GEOLOGIST — 12 years' experience, executive position, major oil company, land and geological depts., desires connection with responsible parties. Nominal salary and interest preferred. Write Box E-484, The Oil and Gas Journal, Tulsa Okla.

AT LIBERTY JUNE 1—Young man, two years college, two years drilling and production experience, and two years supply business. Now with leading manufacturer of rotary drilling machinery. Knows costs and material. Draftsman. Desires job where experience is valued, with chance for advancement. Salary no object. Write Box E-469, The Oil and Gas Journal, Tulsa, Okla.

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EXPERIENCED refinery superintendent; handle design, construction, operation, sales. Write Box E-470, The Oil and Gas Journal, Tulsa, Okla.

CONSTRUCTION SUPERINTENDENT—Specializing in Service and Bulk Stations. Qualified to handle several projects concurrently. Can furnish best of references and will go anywhere. Write Box E-476, The Oil and Gas Journal, Tulsa, Okla.

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Crary Hardware Co.,
McPherson, Kansas.

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MAPS
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THE M. H. HUNTER. CO.
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OIL DEVELOPMENT maps, any county in Oklahoma, 75 cents each; lease block and detail maps. Write for map list. Lindsay Map Co., Franklin Bldg., Oklahoma City, Okla.

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EAST TEXAS MAPS. Gregg and Northwestern Rusk Counties. Oil Development, Survey Boundaries with survey index easily followed. Paper, 20"x24", $2.00 each. Tulsa Map Co., 509½ S. Boulder. Tulsa, Okla.

EAST TEXAS MAPS
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LEGAL

IN THE DISTRICT COURT OF TULSA COUNTY, STATE OF OKLAHOMA.

Forrest E. Gilmore Company, a corporation, Plaintiff, vs. Continental Supply Company, a corporation, Defendant, No. 49,852.

NOTICE TO CREDITORS TO FILE CLAIMS

You and all creditors of the Forrest E. Gilmore Company, a Delaware Corporation, are hereby notified, by virtue of an order of the District Court of Tulsa County, Oklahoma, made on the 4th day of May, 1931, to file a verified statement of your claim with the undersigned Receiver, on or before the 15th day of June, 1931.

The creditors are further notified that any claims which are not filed with the Receiver on or before the 15th day of June, 1931, will be forever barred.

Claims should be directed to the undersigned Receiver at his offices at 204 Beacon Life Bldg., Tulsa, Oklahoma.

J. H. Brooks, Receiver,
Yancey, Spillers & Fist,
Attorneys for Receiver.

IN THE DISTRICT COURT WITHIN AND FOR TULSA COUNTY, STATE OF OKLAHOMA.

Forrest E. Gilmore Company, a corporation, Plaintiff, vs. Continental Supply Company, a corporation, Defendant, No. 49,852.

NOTICE OF SALE

You and each of you will take notice by virtue of an order of sale made and entered on the 5th day of May, 1931, the undersigned J. H. Brooks, Receiver for all of the assets of the Forrest E. Gilmore Company, a Delaware Corporation, located in the State of Oklahoma, will offer for sale and sell to the highest bidder for cash, subject to the confirmation of the Court, certain gasoline plants, equipment and gas contracts described as follows, to-wit: Plant No. 2, located at Mannford, Oklahoma, in the Northeast Quarter of the Northeast Quarter (NE¼ NE¼) of Section Thirteen (13), Township Nineteen (19) North, Range Eight (8) East, Creek County, Oklahoma, 1—36"x 40' Evaporator and knock-out tower; 1—24"x24' Bubble type tail absorber; 1—26"x30' Oil Heater; 1—250-bbl. steel tank, Gas Type. Plant No. 7, located in what is known as the Bowlegs Pool, Oklahoma, in the Northeast Quarter of the Northwest Quarter (NE¼ NW¼) of Section Twenty-three (23), Township Eight (8) North, Range Six (6) East, Seminole County, Oklahoma, 1—Compressor Building; 1—Auxiliary Building; 1—Pump Building; 1—Warehouse; 1—Office; 4—180 HP Clark Twin Gas Engines Direct connected to compressor cylinders (3 of these compressors robbed); 1—40 HP Clark Gas Engine Type P; 1—6 HP F. & M. Gas Engine; 1—Pyle National Generator; 1—4-cycle Hercules Engine Model OX; 1—4-cycle Hercules Engine Model OX (Robbed); Vapor proof fixtures, conduit, wiring, etc., 36'x 2 15/16" steel line shaft, bearings, pulleys, belting, etc.; 2—3" Centrifugal Pumps; 2—6"x4"x6" Boiler Feed Pumps; 1—2½"x5" Horizontal Duplex Geared Pump; Plant Piping (Pipe and Fittings); 14—10"x4'10" T B&M Sections; 25—8¼"x4'8" TB&M Sections; 2—48"x7'0" 3/8" Plate Scrubber Tanks; 1—36"x6'0" 5/16" Plate Accumulator Tanks; 1—36"x6'0" 1/2" Plate Accumulator Tanks; 4—12"x11'0" Welded Pipe Drips; 1—16"x 10'0" Welded Pipe Drips; 3—12"x6'0" Welded Pipe Drips; 1—12"x8'0" Welded Pipe Drip; 1—48"x7'0" 3/16" Plate Accumulator; 1—24"x25'0" Vertical Steam Still; 1—16⅝"x20'0" TB&M Section; 1—23'x42'6" 40' Wall Wood Frame Galvanized Cooling Tower; 2—9'x35' ¼" Plate Stock Tank; 1—9'x35'¼" Plate Stock Tank (bad); 3—10'x40'¼" Plate Stock Tank; 2—9'x20' Storage Tanks; 1—4'x4'x5' ¼" Plate Mixing Vat; 2—75 HP Oil Field Type Boilers; 1—2 Stage Air Compressor, Pennsylvania 3-A; 4—12"x12'0" Welded Casing Air Tanks; 1—6'0"x40'0" Stabilizer Towers—20 Trays 40-lb. WP TB&M; TB&M Railroad Trackage; 5-car loading Rack; 8,000' 8" Std. Line Pipe; 6,000' 6" Std. Line Pipe; 10,000' 4" Std. Line Pipe; 14,000' 2" Std. Line Pipe; 3—Meters, 4 Regulators, Fittings on Field Lines, etc.; Meters and 5 Regulators Plant installation; 5—Recording and Indicating Instruments; Laboratory Equipment, Tools; 1—48" Ereco Stabilizer; 4—8"x 5"x12" Worthington Simplex Pumps; 1—7'x 27' Storage Tank; 1—8'x36' Storage Tank; 1—8'x35' Storage Tank; 3—48"x10' Propane Storage Tanks; 3—48"x20' Vertical Treating Tanks; 1—48"x6' Settling Tank; 1—Cement Mixer. Plant No. 10, located in Little River Pool, Oklahoma, in Southeast Quarter of the Southeast Quarter (SE¼ SE¼) of Section Thirty-five (35), Township Eight (8) North, Range Six (6) East, Seminole County, Oklahoma, 1—Compressor Building; 1—Pump Building; 1—Office Building; 1—Dwelling House; 5—180 HP Clark Twin Gas Engines direct connected to compressors; 1—80 HP Clark Gas Engine; 1—3 KW GE Generator, 110 V. DC; 1—7 KW GE Generator, 125 V. DC; Vapor Proof Fixtures, conduit, wire, etc.; 36'x2 15/16" Steel Line Shaft, Bearings, Pulleys, Belting, etc; 2—4" Worthington Centrifugal Pumps—4M; 3—3" Worthington Centrifugal Pumps—3M (robbed); 1—2" Goulds Pumps; 1—4"x4" Vertical Triplex Pumps (Gasoline); 1—2½" x4" Horizontal Duplex Pump; Plant Piping (Pipe and Fittings); 2—48"x7'5/16" Plate Scrubber Tanks; 1—30"x9'6⅛" Plate Scrubber Tanks; 1—36"x7'0⅝" Plate Accumulator Tank; 6—10"x4'10" TB&M Sections; 2—20'0" x42'0" 28' Wall wood frame galvanized iron cooling tower; 1—18'0"x30'0" 14' Wall wood frame galvanized iron cooling tower; 1—20'x20'x6'6" Deep Concrete Hot Well; 3—8'x 36'¼" Plate Stock Tanks; 1—1,000-bbl. Bolted Steel Tank; 3—75 HP Boilers Oil Field Type; 1—60 HP Boiler Oil Field Type; 3—Water Wells; 1—10 HP F. & M. Gas Engine; 1—36"x6'0" ¼" Plate Accumulator Tank; 1—30"x7'0"⅜" Plate Accumulator Tank; 6,250 ' 12" Std. Line Pipe; 1,500' 6⅝" 20-lb. Casing; 6,000' 6" Std. Line Pipe; 1,000' 5 3/16" 17-lb. Casing; 8,500' 4" Std. Line Pipe; 20,00' 3" Std. Line Pipe; 10,000' 2" Std. Line Pipe; Meters, Regulators, Drips, Fittings on Field Lines; Meters and Regulators, Plant installation; Recording and Indicating Instruments; Laboratory Equipment; Tools; Warehouse Stocks; 1—Ereco 48" Steam Still; 1—Ereco 60" Absorber; 1—7 Bay Pritchard Cooling Tower; 1—30"x20' Tail Absorber; 9—3 Pass GR Sections; 2—3 Pass GR Sections; 6—1 Pass GR Sections; 1—GR Preheater; 4—GR Heat Exchangers; 2—Newton Heat Exchangers; 2—6"x4"x6 Pumps;1—4½x3x4 Pump; 1—6-bbl. Steel Tank; 1—48"x12' Scrubber; 1—60"x60" Accumulator Tank; 1—48"x5' Accumulator Tank; 1—5'x6' Oil Vent Tank; 2—90 HP Terry Turbines connected with 3 Centrifugal pumps; 1—30 HP Terry Turbine connected with 2 Centrifugal pumps; 1—Chicago Pneumatic Air Jammer direct connected to 10"x 12" Cylinder. Plant No. 11, located at Clearview, Oklahoma, in Northwest Quarter of Northwest Quarter (NW¼ NW¼) of Section Thirty (30), Township Eleven (11) North, Range Eleven (11) East, Okfuskee County, Oklahoma, 1—Compressor Building (bad condition); 1—Pump Building; 1—Frame Warehouse Shack; 1—Frame Office Building; 1—35 HP Foose Gas Engine Dismantled (junk); Plant Piping (Pipe and Fittings); 9—10"x4'8" TB&M Sections Low Stage; 20—8¼"x4'8" TB&M Sections High Stage; 1—36"x10'0" 9/16" Scrubber Tank; 1—48"x9'6" 5/16" Plate Scrubber Tank; 1—6⅝" Heat Exchanger Section; 1—48"x20' Vertical Treating Tank; 1—18'x18'x7'6" Deep Hot Well; 1—8'x36'¼" Plate Stock Tank; 1—4'x40'0" TB&M Gasoline Stabilizer; 2—Regulators. Plant No. 13, located at Little River Pool, Oklahoma, in Northwest Quarter of Southwest Quarter (NW¼ SW¼), Section Eleven (11), Township Seven (7) North, Range Six (6) East, Seminole County, Oklahoma, 1—Compressor Building; 1—Pump Building; 1—Garage; 1—Frame Dwelling 1—400 HP Twin Tandem Engine direct connected (robbed); 2—180 HP Clark Twin Gas Engines direct connected (robbed); 1—90 HP Single Cycle Auxiliary Power; 1—7½ KW F. & M. Generator; Vapor Proof Fixtures, Switchboard, Ammeter, Volt Meter, Wire, etc.; 20' 2 15/16" Steel Line Shaft, Couplings, Pulleys, Bearings; 3—3" Worthington Centrifugal Pumps (2 robbed); 1—4x4 Deming Triplex Pump; Plant Piping (Pipe and Fittings); 1—8¼"x4'8" TB&M Closed Type Gas Cooler; 14—10"x4'8" TB&M Low Stage Gas Coolers; 36—8"x4'8" TB&M High Stage Gas Coolers (junk); 1—8'x10'⅜" Plate Scrubber Tank; 1—54"x7'6" 5/16" Plate Accumulator Tank; 1—20'x32'x28' Wall Wood Frame Galvanized Iron Cooling Tower; 1—22'x32'x28' Wall Wood Frame Galvanized Iron Cooling Tower; 1—18'x18'x 8' Hot Well; 1—40 HP Steam Boiler (junk); 1—200' Water Well; 1—160' Water Well pumped with Jack; 1—F&M Geared Pump Jack; 2—Ingersoll-Rand Air Compressors (1 robbed); 5—12"x12' Welded Air Storage Tanks; Field Pipe Lines and Fittings; 1—400 HP Gas Engine; 1—180 HP Gas Engine; 1—80 HP Gas Engine; (The 400 HP Gas Engine, the 180 HP Engine and 80 HP Gas Engine have an encumbrance thereon of approximately $7,000.00 and only the equity in said gas engines will be offered for sale).

You are further advised that at the time sale of the above described plants and equipment is held, gas contracts in connection with the Bowlegs Plant and described as follows, to-wit, will be sold: Seller, Atlantic Oil Producing Co.; Lease Description, Baker—40 acres, Section 10-8-6; Fleet—40 acres, Section 23-8-6; Grayson—40 acres, Section 13-8-6. Date of Contract, 5-27-27. Expiration of Contract, Term of Lease.

Gas Contracts in connection with the plant at Little River Pool will be offered for sale, same being described as follows, to-wit: Seller, Black Oil & Oil. Lease Description, Nity—80 acres, Section 35-8-6; Date of Contract, 11-5-27; Expiration of Contract, Term of lease. Seller, Blackwell Oil & Oil; Lease Description, Baker—40 acres, Section 11-7-6; Date of Contract, 6-21-28; Expiration of Contract, Term of lease. Seller, Blackwell Oil & Oil; Lease Description, Thomas—80 acres, Sec. 11-7-6; Date of Contract, 3-14-28; Expiration of Contract, Yearly—60 days' notice. Seller, Gypsy Oil Co.; Lease Description, Potty—40 acres, Sec. 35-8-6; Date of Contract, 3-14-28; Expiration of Contract, Yearly—60 days' notice. Seller, Mid-Continent Petroleum Corp., Lease Description, Wadsworth—80 acres, Section 36-8-6; Date of Contract, 10-17-28; Expiration of Contract, Term of lease, 60 days' notice. Seller, Prairie Oil & Gas Co.; Lease Description, Chilcoat—40 acres, Section 25-8-6; Date of Contract, 3-15-28; Expiration of Contract, Term of Lease (Yearly renewal). Seller, Prairie Oil & Gas Co.; Lease Description, Coker—80 acres, Section 1-7-6; Date of Contract, 1-28-29; Expiration of Contract, Yearly. Seller, Prairie Oil & Gas Co.; Lease Description, House—40 acres, Section 2-7-6; Date of Contract, 6-23-28; Expiration of Contract, Yearly. Seller, The Texas Company; Lease Description, Brooks B—120 acres, Section 25-8-6; Date of Contract, 10-5-28; Expiration of Contract, Two years—thereafter 60 days' notice. Seller, The Texas Company; Lease Description, Coker—80 acres, Section 1-7-6; Date of Contract, 3-21-28; Expiration of Contract, One year—thereafter 60 days' notice. Seller, Tidal Oil Co.; Lease Description, House—10 acres, Section 1-7-6; Date of Contract, 2-25-28; Expiration of Contract, Two years—thereafter 60 days' notice. Seller, Phillips Petroleum Corp.; Lease Description, Davis—40 acres, Section 2-7-6; Date of Contract, 1-31-28; Expiration of Contract, One year—thereafter 60 days' notice. Seller, Shell Petroleum; Lease Description, Caesar—40 acres, Section 11-7-6; Date of Contract, 8-24-28; Expiration of Contract, Term of lease.

You are further notified that the plants and equipment and gas contracts will be each offered separately and together and will be sold to the highest bidder. You are further notified that at some of the plants, parts of the equipment which are not necessary to the operation of the plant may be offered for sale separately. All bidders will be required to deposit with Receiver at the conclusion of the sale ten (10) per cent of the amount of his bid in cash and the balance will be due and payable in cash when and if the sale is confirmed by the Court. Any further or detailed information concerning the property to be sold may be obtained from the undersigned Receiver or C. J. Smith at the offices of the Receiver, 204 Beacon Life Bldg., Tulsa, Okla.

You are further advised that the Plant No. 2 at Mannford, Oklahoma, will be advertised for sale and sold to the highest bidder on the 22nd day of June, 1931, at 10 o'clock A. M. The plant, equipment and contracts on Plant No. 7, located in Bowlegs Pool, will be offered for sale 23rd day of June, 1931, at 10 o'clock A. M. The plant, equipment, located at Little River Pool, Oklahoma, together with contracts, will be offered for sale on the 23rd day of June, 1931, at 2 o'clock P. M. Plant No. 11, located at Clearview, Oklahoma, will be offered for sale on 22nd day of June, 1931, at 4 o'clock P. M. Plant No. 13, at Little River Pool, together with gas contracts belonging thereto will be offered for sale on 23rd day of June, 1931, at 4 o'clock P. M.

Each of the plants and contracts will be offered for sale at the plant sites as above described and at the hour and day set forth.

J. H. Brooks, Receiver,
204 Beacon Life Bldg., Tulsa, Okla.
Yancey, Spillers & Fist,
Attorneys for Receivers, Tulsa, Okla.

RUMANIA TO BUILD GASOLINE PIPE LINE

(Continued from Page 24)

be withstood by the industry under present conditions. The charge for transportation by pipe line would be agreed upon at a rate of probably about 4,000 lei per 10 tons, so that the industry would immediately receive the benefit of the difference between these two rates. The individual producing companies will get this benefit.

Based on transporting 68,000 cars of gasoline per year at a rate of 4,000 lei per car, the gross income would be 272,000,000 lei. Operating expenses are calculated at 17,000,000 lei per year, and the six monthly payments would total 168,000,000 lei per year, thus leaving a net revenue of about 83,000,000 lei during the first eight years of operation or the period of amortization. For the following years the line should show a revenue of over 250,000,000 lei based on a gross income of 272,000,000 lei less operating expenses of 17,000,000 lei.

Growth of Gasoline Output

A few years ago when the laying of a gasoline pipe line was being studied, the production of crude oil in Rumania was about 300,000 cars per year, and the gasoline extraction represented only about 10 per cent or 12 per cent of this quantity. Today Rumania's crude production is between 600,000 and 700,000 cars per year, and the adoption of modern refining methods, including cracking, has increased the production of gasoline to about 30 per cent of the quantity of crude, and this figure may be expected to increase in future. These figures will indicate the necessity for a large capacity gasoline pipe line.

When the pipe line is installed, the railway tank cars, by which the bulk of Rumania's gasoline is transported, will be freed for other purposes, and as the government has now given permission for the export of crude oil, the railways will be able to devote their tank cars for this purpose, and they will thus gain compensation for the gasoline traffic which will be taken from them by the pipe line. Further than this, the release of railway tank cars from gasoline service will allow the improvement of the distribution of crude and oil products in Rumania itself, which is very defective and operates against any increase in the internal gasoline consumption of the country.

Apart from the efficiency of the transportation of gasoline through pipe lines for long distances, the creation and organization of this particular pipe line provides other advantages both for the Rumanian state and the oil industry. The cost of transportation by pipe line as compared with railway is immediately largely reduced owing to the fact that empty tank cars returning represent dead tonnage on the railway. The oil industry will be able to satisfy its selling obligations of an urgent nature by advances of goods in exactly the same fashion as use is being made of the existing kerosene pipe line. Evaporation loss by pipe line is at least 3 per cent under the losses resulting from tank car transportation.

Needed to Relieve Industry

It has been mentioned that the government has recently allowed the export of crude oil from Rumania, which up to some time ago was prohibited by law. In order to slightly relieve the oil industry in Rumania permission was granted for the export of some 50,000 cars, mostly out of state royalties and chiefly to other Balkan countries. The distances involved are only about 150 to 170 kilometers, but the transportation of this quantity has not yet been completed, as the railways have not sufficient tank cars, and the construction of the gasoline pipe line will release such railway tankage, which, as can be clearly seen, is urgently required. This would bring a very definite income to the railways and also allow for the disposal of at least a part of the crude oil produced in Rumania which cannot be handled by the present refining capacity of the country.

S.A.R. Conducta's proposal, in conjunction with the technical collaboration of the National Supply Corp., has been accepted by the government pipe line department and has met with the approval of the minister of industry and commerce, together with the Rumanian government economic delegation and Rumanian council of ministers. The contract was presented to the Rumanian parliament for ratification, but, unfortunately, owing to pressure of other urgent legislation it was not possible for it to be passed by the house before parliament rose on April 1.

In spite of the manifest advantages which this line will have for Rumania in general, and the Rumanian oil industry in particular, it is extremely surprising to learn that it has received some political opposition, the London Journal says, which obviously cannot be raised against the pipe line scheme itself, but is inspired by purely political and party considerations.

There is no doubt that this line is essential for the future of the Rumanian oil industry; in fact, it is obvious that without it the outlook for Rumanian oil is black indeed, and the Association of Rumanian Oil Producers and all interested in the oil industry should impress upon the Rumanian government the vital necessity for the ratification of this contract immediately parliament reassembles.

COMPREHENSIVE VIEW OF A GREAT OIL FIELD

(Continued from Page 24)

lieved the irregularity of the porosity affects the recovery per acre and may cause uneven water encroachment.

Practically Drilled Up

The Johnson and School Land sand zone is believed to be practically drilled up and it is showing the largest decline in the April potential tests. About 40 per cent of the oil has been recovered, and this percentage usually represents the flush production of a pool.

The recent potentials indicated that the water was coming into the Johnson and School Land sand zones from what is believed to be two sources. About 40 of the wells showing water had been drilled into the Stamper lime, which is about 40 feet thick and which overlies the Arbuckle lime. Operators, in their effort to secure a large quantity of gas to flow the wells, drilled into the lime below the sand. The Stamper lime formerly carried a large gas volume. The initial production of the wells is believed by some to have been injured by the large volume of gas, and now the gas zone in the lime is showing water. Some of the wells have been plugged back, but adjacent wells are showing increasing water, which is spreading. It indicates the migration of water from the lime underlying the pay horizon has started and it is doubtful if it can be stopped.

Edge Water Encroachment

The other indication was of edge water encroachment and it was noticed in about 20 wells. The first potential of the field taken in January only indicated a small area was showing water, but the April tests developed that water has followed a narrow porous finger-like belt advancing about a mile in only four producing days during the last few months. The fact that the water shows unusual migration in a field so slowly produced as the Oklahoma City area has been, and in a part of the field where no waste gas has occurred, and pressure has been maintained, shows what water will do in sands of varying porosity. It apparently takes up most of the pressure decline caused by oil and gas production.

The deep sand production in the Santa Fe Springs Field in California had almost the identical water advancement clear across the structure, while on each side of the structure wells lower down were not affected. The water in the Oklahoma City Field shows signs of spreading out. The same thing happened in the Greater Seminole area, and it does not mean the end of the oil production—some leases will be ruined, and others probably benefited.

In the Oklahoma City Field, the water from the Stamper lime and the edge water advance indicates the wells in the field are nearing the end of the flowing stage in the Johnson and School Land sands. The air-gas lift method may not be profitable under the present proration order because the wells are only allowed to produce for a few days in several months. Some express the opinion the water intrusion may have considerable influence on the amount of oil to be brought to the surface and offered on the market from the area.

Wilcox Has Small Drainage

The Wilcox sand zone did not produce until October, 1930, 10 months after the field was opened. Therefore, only a small amount of its oil has been recovered—about 6 per cent. From the wells already completed the sand is expected to average about 100 feet in thickness in its producing area, with excellent porosity and little of the dolomitic cement found in the other sand zones in the field. It is known that the Greater Seminole area has averaged around 20,000 bbls. per acre from about 30 feet of sand of similar type. With greater pressures and better saturation in the Oklahoma City Field, an average of 50,000 bbls. per acre is not believed excessive. It will also allow for probable losses by water encroachment and loss into the gas sand and sands of the School Land zone. The small rate of the allowable production in the area prevents drainage by the present wells. The decline of the 141 wells in 1½ days on production, comparing the January and April potentials, was only 2 per cent, or one-third of the decline in the Johnson sand zone.

It is believed about one-half of the probable Wilcox sand zone has been drilled to date. It has been found to be three or four locations wide in the south end of the field, but the more gentle dips in the north end have doubled the productive width there. The west edge is believed to be near the present producing wells as some of them are too deep to drill through the sand without finding water, so it is estimated that a location or two west of the present edge wells would be the west limits of the producing area.

Water has been found in the south end of the field in the Wilcox sand but operators in that part of the field have been careful not to drill below the water stratum which has been found to be uniform in the Wilcox sand zone over the entire length of the field.

Due to the very porous sand, adjacent wells would affect each other if open at the same time. The edge water advance would be more regular than in the sand zone under the present method of withdrawal under proration. The small gas-oil ratio, heavy saturation and excellent porosity which allows easier entrance of the oil into the hole will also allow edge water to keep close to oil as withdrawal takes place.

It is believed by many that the Wilcox sand zone will probably permit of successful operation of the air-gas lift method when the wells stop flowing, and it is expected they will maintain a large production for the next few years.

MICHIGAN FIELDS

(Continued from Page 45)

Goo Co.'s No. 1 Mahoney, both of which are headed for the Monroe gas and are fishing.

Oil production of the Muskegon Field is practically the same today as it was a year ago, indicating that the wells have been producing rather steadily as few new wells have been added during the year, according to a survey just completed. About 1,800 bbls. daily is produced from about 255 wells, or an average of between 7 and 8 bbls. to the well. Three Muskegon refineries are now purchasing and running all of this oil as the Stanolind Oil & Gas Co., former operator of the largest pipe line in the field, last week announced that it would take up its line and leave the field.

DALLAS MEETING A.P.I. DIVISION OF PRODUCTION

(Continued from Page 35)

& Refining Co., Houston; and W. L. Todd, Simms Oil Co., Dallas.

Program as Prepared

The formal program, as tentatively prepared, follows:

Tuesday, June 2—Meetings of divisional standing committees; joint meeting, Central Committee on Standardization and Special Committee on the General Committee, to approve standardization reports.

Wednesday, June 3, 9:30 a.m.—General Session on Production Practice.

"Efficient Operation of Pumping Rigs," W. C. Shutts and M. Bowman Thomas, Humble Oil & Refining Co., Houston.

"High Volumetric Efficiency in Oil Well Pumping and Its Practical Results," H. N. Marsh, B. H. Robinson and D. H. Kingman, General Petroleum Corp. of California, Los Angeles, Calif.

"Power Transmission Efficiency of Pumping Wells," C. L. Shirley, Shell Petroleum Corp., Tulsa.

"A Method for Determining Production Allowances in Prorated Fields," H. D. Wilde, Jr., and T. V. Moore, Humble Oil & Refining Co., Houston.

2 p.m.—General Session on Current Production Situation.

Address by Governor R. S. Sterling, of Texas.

Address by R. R. Penn, Penn Oil Co., Dallas, vice president of the Institute.

"Proration," Warner Clark, Standard Oil Co. of California, San Francisco, Calif.

"Legal Aspects of Gas Conservation in the Production of Oil," R. E. Hardwicke, lawyer.

8 p.m.—Opening Meeting of Central Committee on Drilling and Production Practice, to which the public is invited.

Thursday, June 4, 9:30 a.m.—General Session.

Report of American Petroleum Institute Research Associate on Corrosion at United States Bureau of Standards, by Gordon N. Scott, Washington, D. C.

"Legal Phases of Oil Field Pollution," R. S. Cole, Gypsy Oil Co., Tulsa.

"Economic Aspects of Accident Prevention," George F. Prussing, Union Oil Co. of California.

1:30 p.m.—Drilling Practice.

"Development, Reclamation and Disposal of Rotary Mud in California," E. P. Tallant, Union Oil Co. of California, Los Angeles, Calif.

"Drilling Fluid Problems and Treatment in the Gulf Coast," C. P. Parsons, Halliburton Oil Well Cementing Co., Duncan, Okla.; W. T. Doherty, Humble Oil & Refining Co., and Stanley Gill, Gulf Production Co., Houston.

"Oil Field Boiler Tests," Hu M. Harris and J. E. Eckel, Humble Oil & Refining Co., Houston.

"Internal Combustion Engines for Rotary Drilling," David L. Trax, Gypsy Oil Co., Tulsa, and R. R. Hawkins, The Texas Company.

"Hard Surfaced Rotary Bits," Blaine B. Westcott, the Gulf companies.

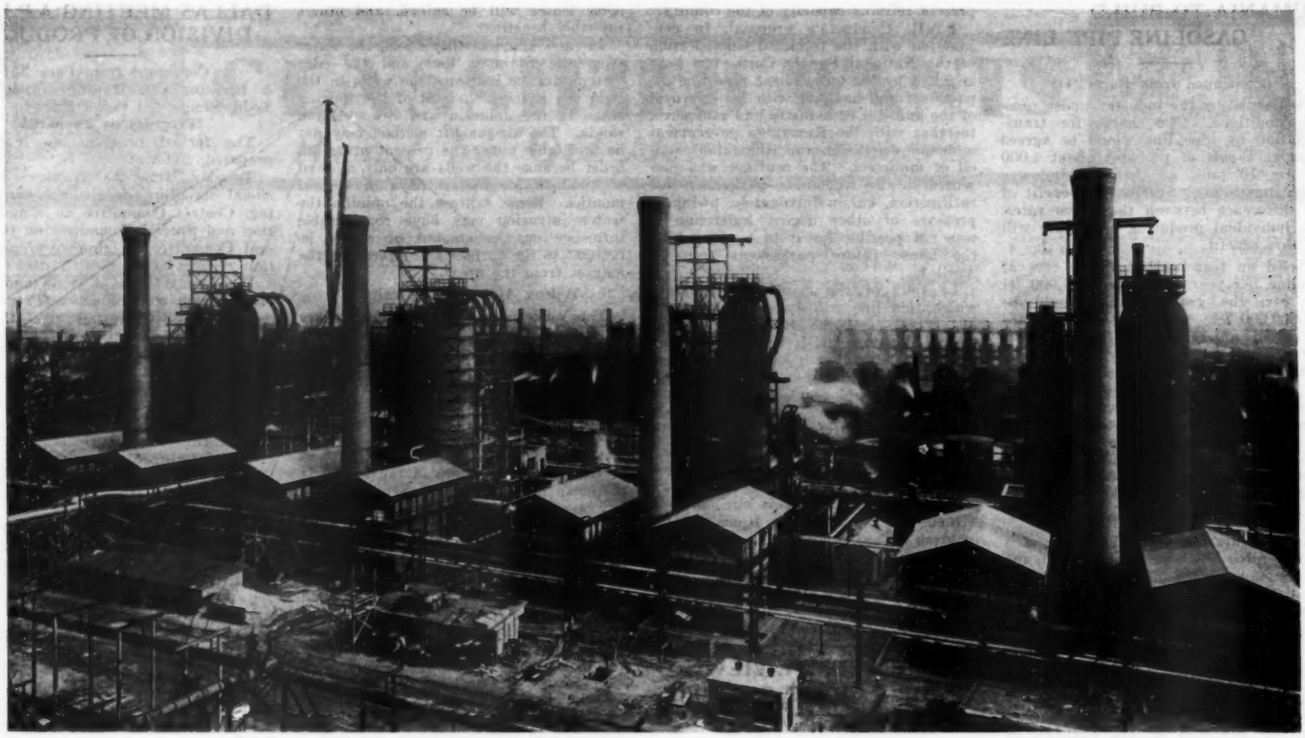
2 p.m.—Meeting of Division of Production General Committee.

The midyear meeting is one of three held this year, the Division of Marketing having met at Chicago in March and the Division of Refining at St. Louis in April. They permit of technical discussion and reports, thus leaving time on the program of the Institute's annual meeting, to be held this year November 10 to 12 at Chicago, for consideration of the petroleum industry's broader problems.

The general sessions of the midyear meeting will be open to all interested oil men.

GEORGE McRITCHIE DIES

CHATHAM, Ontario, May 9.—George McRitchie of Sarnia died recently as the result of an automobile accident, in his seventy-fourth year. As a boy he learned the oil trade on the H. W. Lancey properties at Copleston.



Outstanding Refinery Design

Four duplicate Foster Wheeler crude distillation units are shown nearing completion. These two-stage units will each process 10,000 barrels of crude per day.

Flexibility in the design of the equipment permits the operation of either the atmospheric or vacuum stages independently.

FOSTER WHEELER CORPORATION
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Foster Wheeler Limited, Toronto-Montreal, Canada.
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FOSTER WHEELER

Brief Items for Petroleum Refiners

Hewetson Elected Vice President of Louisiana Company

H. H. Hewetson, who has been vice president of the Colonial Beacon Oil Co., Boston, Mass., was elected vice president in charge of manufacturing of the Standard Oil Co. of Louisiana at Baton Rouge, La., a subsidiary of the Stand-

H. H. Hewetson

ard Oil Co. of New Jersey, last week. As previously announced, J. C. Hilton was elected president of the company succeeding D. R. Weller, who was made chairman of the board.

J. E. Skehan, formerly of the Standard Oil Co. of New Jersey, Newark, N. J., was elected vice president in charge of sales. He succeeds C. O. Scholder who has been in charge of sales for a number of years. Mr. Hewetson succeeds C. I. Fiero. Messrs. Fiero and Scholder continue as directors and with Messrs. Hewetson, Skehan, W. L. Straton and L. Link constitute the recently formed operating committee.

A. K. Gordon was re-elected vice

(Continued on Page 131)

COMPLETING SMALL PLANT

The new skimming plant of the Norgold Refining Co., located a short distance west of Olney, in Archer County, of the North Texas area, will be in operation within 30 days, according to present plans. The president of the company and principal owner is Norman Goldsmith, a resident of Olney.

The plant, which will have a skimming capacity of 800 bbls. daily, will operate with crude oil obtained from leases near the refinery.

HUSTON OIL ENLARGES PLANT

CORPUS CHRISTI, Tex., May 12.—The Huston Oil Co. will enlarge its refinery located here. Plans have been made necessitating an expenditure of $1,000,000 and will include the building of storage tanks for the handling of crude and refinery products for export.

TO BUILD GREASE PLANT

The Associated Refineries, Ltd., with a plant located at Saskatoon, Alberta, Canada, will add facilities for the manufacture of grease and compounded oils.

OHIO OIL CO. BUYS 14 STATIONS IN COLUMBUS

COLUMBUS, Ohio, May 12.—The Ohio Oil Co. has purchased 14 service stations in the Columbus, Ohio, area and will distribute the company's "Linco" trade marked products here. Other stations will be added throughout Ohio in the near future and a general expansion of marketing facilities will be made in order to entirely balance the producing, refining and sales divisions.

Two years ago the Ohio Oil Co. acquired the properties of the Transcontinental Oil Co., operating three refineries and marketing facilities in Oklahoma and North Texas. These were located in Bristow and Boynton, Okla., and the third is located at Fort Worth, Tex. The combined crude capacity of these plants is 12,500 bbls.

More recently, the properties of the Del Rio Refining Co. with a 3,000-bbl. plant located at Del Rio, Tex., was purchased and the company's marketing facilities were expanded in this area. This plant also operates under the Marathon name. The Ohio products are supplied by the refinery of the Lincoln Oil Refining Co., another subsidiary company of Robinson, Ill.

R. E. WILSON, DIRECTOR, STANDARD OF INDIANA

Dr. R. E. Wilson, head of the development and patent department and Louis L. Stephens, general counsel, were elected to the board of directors of the Standard Oil Co. of Indiana last week.

Doctor Wilson, who is one of the out-

Dr. R. E. Wilson

standing technologists of the refining industry, has been connected in various capacities with the Indiana Standard since 1922. For several years, he was a member of the faculty of the Massachusetts Institute of Technology. As a member of the faculty he was the director of the Research Laboratory of Applied Chemistry and associate professor of chemical engineering from 1920 to 1922. Previously he had been connected with the research laboratory of the General Electric Co. and the Bureau of Mines. During the World War he was a captain in the Chemical Warfare Service.

Mr. Stephens has been a member of the legal staff since 1924. With the election of Doctor Wilson and Mr. Stephens, the Standard of Indiana board now has 13 members.

MOSER HEADS VACUUM RESEARCH DEPARTMENT

NEW YORK, May 12.—Directors of Vacuum Oil Co. have authorized the organization of a research department as a major co-ordinate of the company, C. A. Moser, member of the board of directors, being chairman of the new committee which will co-ordinate the various scientific activities of the company and its subsidiaries. Included in the membership of the research department are representatives of the board, the lubricating, refined oil, automotive departments, and the manufacturing department, as well as the chief of research laboratories.

Mr. Moser has been active for many years in the company's research activities as have a number of other members of the committee, including Dr. H. A. Curtis, chief of the research laboratories; H. F. Abrams, chairman of the manufacturing committee; L. B. Van Leuven and B. W. Dudley of the manufacturing committee; A. L. Beall, fuel engineer of the refined committee, under whose dirction much research work on light products has been carried on; F. B. Killian, chief of the engineering division of the automotive department under whose direction much of Mobiloil research has been carried on since the early days of the automobile, and B. C. Voshell, manager of the technical department. The company has substantially increased the equipment and facilities of its research laboratories at its Paulsboro refinery and much of the work of its new department will center at Paulsboro.

BASIC PATENT ISSUED TO TEXAS PACIFIC CO.

FORT WORTH, Tex., May 12.—The United States Patent Office has issued to the Texas Pacific Coal & Oil Co. a basic patent in the dewaxing of paraffin base lubricating oils. This has followed the seven years of research and development work at the company's local refinery and laboratories under the direction of Dr. E. R. Lederer, vice president.

The first commercial production of the unblended zero cold test motor oils was carried out in 1927 and the products was first offered to motorists in September of that year.

The Texas Pacific Coal & Oil Co. has been generally recognized as a pioneer in the field for the development of low cold test lubricants and additional work is now under way.

COMPLETING NEW PLANT

FORT WORTH, Tex., May 11.—The Taylor Refining Co. has completed four 5,000-bbl. tanks, six 10,000-bbl. tanks and is now completing two 20,000 bbl. tanks at its refinery at Tyler which will be in operation around June 1. The Tyler Pipe Line Co., which has an 8-inch line from Overton to this refinery, has two 55,000-bbl. tanks and is using the Taylor Refining Co.'s 60-car loading rack near the plant for loading oil. The plant will have a daily capacity of 16,000 bbls. and will be electrically operated. It is the first plant to be built in Tyler and will process crude from the Kilgore and Joiner Pools.

ENLARGES PLANT CAPACITY

HOUSTON, Tex., May 11.—Deepwater Oil Refineries, Inc., has just put into operation its new and enlarged refinery on the Houston Ship Channel east of Houston. The additions to the plant include a large pipe still and bubble tower, which has increased the capacity of the plant to around 4,000 bbls. daily.

J. M. Wadsworth to Join Foster Wheeler Corp. in New York

J. M. Wadsworth, well known among Mid-Continent and California refiners, has resigned as superintendent of refineries for the Phillips Petroleum Co. to join the Foster Wheeler Corp. in New York City. His new duties will include the correlation of refinery equipment de-

J. M. Wadsworth

sign to suit the varied needs in the scattered refining areas and particular attention will be paid to the design of new types of equipment.

Mr. Wadsworth was introduced to the oil business when he entered the employ of the Associated Oil Co. of California in 1910. In 1914 he joined the Shell Co. of California as superintendent of construction and the experience gained there was later augmented with three years of practical experience in several refineries while with the Bureau of Mines. This led to his appointment as state fuel engineer for the fuel administration during the World War.

In 1919 he joined the Cities Service group as construction superintendent and shortly thereafter was named general superintendent of refineries for the Empire Refineries, Inc.

He has since remained in active charge of refining operations in the Mid-Continent. In this period he was superintendent of plants for the Pierce Petroleum Corp. and later joined the Independent Oil & Gas Co. as vice president and manager of refineries. Following the merger of the Independent and the Phillips Petroleum Co., Mr. Wadsworth was named superintendent of the companies' refineries with plants located in Kansas City, Kans.; Okmulgee, Okla., and Borger, Tex.

His resignation from the Phillips companies becomes effective May 15 after which he will move his family from Tulsa to New York City.

BUILDING REFINERY STORAGE

HOUSTON, Tex., May 11.—Houston Oil Co. has under construction two additional 55,000-bbl. tanks for crude storage and one 20,000-bbl. gasoline tank at its Viola (Corpus Christi) refinery. The additional 55,000-bbl. tanks have been provided for storage of East Texas crude which will be moved in by tank car.

Manufacture of Natural Gasoline

CRACKING OF NATURAL GAS HOLDS ATTENTION

While speaking before the Institute of Petroleum Technologists recently, James Kewley, president, outlined the more recent developments in the utilization of natural gas and gasoline plant by-products for the manufacture of specialties. Considerable research work is being carried out both in America and abroad and patents are being filed in large numbers, indicating the great interest being developed. The laboratory work of several individuals and companies have already proved the commercial possibilities of cracking natural gases and vent gases from refineries for the manufacture of ethylene, alcohols and the many derivaties of the base materials and now the possibilities of manufacturing motor fuels of high antiknock value is being brought nearer realization on a commercial scale. In citing the different investigations being made and the use for the products of pyrolosis, Mr. Kewley said:

"Apart from the great developments in the uses of high pressures and temperatures made possible by the improvements in engineering technique, the developments in cracking and hydrogenation processes, the most interesting work was perhaps being done in the direction of using gases, both natural and cracked, as basic material for the manufacture of many valuable products which were finding new uses and creating new markets. Ethylene gas was now used to accelerate the ripening of fruit; isopropyl alcohol found application as a base for perfumes; glycol—a body similar to glycerin—was largely used as an antifreeze radiator liquid; various alcohols and their derivatives were appearing on the scene and would soon become available in tank car lots. A recent new petroleum product, which was evidently going to reduce the death rate in America, was a denaturant for alcohol in place of wood spirit. Horrible though it was to the taste, it could be consumed by hardened experts and it did not blind or kill."

ASK FOR GAS BIDS IN KETTLEMAN HILLS AREA

The Department of the Interior has issued a call for bids to be received on June 1, 1931, for the purchase of casinghead gas accruing as royalty to the Government from lands in the North Dome, Kettleman Hills, Calif., now operated as a unit by the Kettleman Hills North Dome Association. Bids will be received for the gas for periods beginning July 1, 1931, and ending on March 31, 1932 to 1936. Bids for the gas may be stated either as a flat rate in cents per 1,000 cubic feet or as such flat rate plus a differential in cents per gallon of gasoline content.

Due to the uncertainty in regard to the future method of operation in the field, the Government in its announcement explains "that there are wide variations possible in the quantity and quality of royalty oil and royalty wet gas accruing to the United States and subject to sale. The Government does not guarantee the availability of specific quantities or qualities but proposes to dispose at this sale of all its royalty oil and royalty wet gas from the North Dome whatever the quantity and quality thereof may be."

At present there is 15,000,000 feet of gas available testing an average of 1.2 gallons of natural gasoline per 1,000 cubic feet. The Kettleman Hills area is now the largest producer of natural gasoline in California.

ANNUAL PROGRAM IS ARRANGED TO ENCOURAGE MAXIMUM ATTENDANCE

By concentrating the reading of the papers during the tenth annual meeting of the Natural Gasoline Association of America to be held at the Mayo Hotel in Tulsa, May 19, 20 and 21, it is expected that a larger number of plant operators will attend. The revised program appears below and provides for the reading of the first papers Tuesday afternoon. In a similar manner, the program has been so arranged as to make possible closing the meeting at noon Thursday. This plan was adopted for the purpose of cutting down the hotel expense for companies and individuals.

Another revision has been in the scheduling of the technical meetings in which case the morning sessions will begin at 9 o'clock and the afternoons at 1:30.

The Natural Gasoline Supply Men's Association will again provide the entertainment which will include a smoker on Tuesday night and a dance Wednesday night. A cold lunch will be served Tuesday. The association will not serve a lunch Wednesday noon, leaving that open to the members to form their own parties or groups. On the third day a hot lunch will be served by the supply men, a new feature in their program.

Another feature to be introduced this year will be carried out by a committee under A. J. Kerr of the Mid-West Equitable Meter Co., in charge of the dance. At previous dances some of the out-of-town men did not go because they were not acquainted. Mr. Kerr's committee will attempt to fill this need and as explained by Ray Miller, secretary of the association: "We feel a system will be adopted which will guarantee a maximum mileage on the floor to every one who cares to attend."

Included in the smoker program will be a stage show followed by a recent release depicting, in moving pictures, "Prosperity in the Gasoline Business"

(Continued on Page 139)

PROGRAM—TENTH ANNUAL CONVENTION NATURAL GASOLINE ASSOCIATION OF AMERICA—May Hotel, Tulsa, Okla., May 19-21, 1931

TUESDAY MORNING, MAY 19

10:00 a.m. to 12:00 m.—Registration.

10:00 a.m.—Annual Meeting, Natural Gasoline Supply Men's Association. Election of directors.

12:00 m.—Dutch Lunch, furnished by Natural Gasoline Supply Men's Association.

TUESDAY AFTERNOON, 1:00 P.M.

Frank L. Chase, Lone Star Gasoline Co., chairman.

Welcoming Address, by Frank L. Chase.

President's Address, by Dr. E. R. Lederer, Texas Pacific Coal & Oil Co.

Appointment of Nominating Committee.

Report of Active Standing Committees of the Association

1. Gas Contract Committee—T. R. Goebel, Skelly Oil Co., chairman.
2. Standardization Committee—George P. Bunn, Phillips Petroleum Co., chairman.
3. Sales Managers Committee—A. T. Scherer, Sinclair Oil & Gas Co., chairman.
4. Technical Committee and Aviation Committee—R. C. Alden, Phillpis Petroleum Co., chairman.
5. Standard Forms Committee—A. H. Menuet, Skelly Oil Co.
6. Gas Testing Committee—George P. Bunn, Phillips Petroleum Co., chairman.
7. Liquefied Gas Committee—Emby Kaye, Skelly Oil Co., chairman.

Economic Developments of the Natural Gasoline Industry

1. "Production and Transportation of Natural Gasoline," by F. E. Rice, Phillips Petroleum Co.
2. "Natural Gasoline Situation From the Standpoints of the Natural Gas Pipe Line and Carbon Black Manufacture," by W. E. Reardon, Columbian Gasoline Corp.
3. "The Kettleman Hills of Today," by C. R. Burgess, Standard Gasoline Co.
4. General Discussion.

TUESDAY EVENING, 8:00 P.M.

Stag Smoker, furnished by Natural Gasoline Supply Men's Association.

WEDNESDAY MORNING, MAY 20, 8:00 A.M.

D. E. Buchanan, Hanlon-Buchanan, Inc., chairman.

"New Developments in Plant Processes and Equipment," by G. M. Davidson, Empire Oil & Refining Co.

Discussion by E. A. Wooden, Sinclair Oil & Gas Co.

"The Disposal of Residue Gas," by D. C. Williams, Continental Oil Co.

Discussion by D. A. Sillers, Lone Star Gasoline Co.

"A Resume of the New Specifications for Natural Gasoline," by R. C. Alden, Phillips Petroleum Co.

Discussion by George G. Brown, University of Michigan.

WEDNESDAY AFTERNOON, 1:30 P.M.

E. L. Peck, Empire Oil & Refining Co., chairman.

"Fractionation Control," by S. S. Smith, Shell Petroleum Corp.

Discussion by W. G. Hiatt, Phillips Petroleum Co.

Paper: Subject and speaker to be selected by Western Petroleum Refiners Association.

"The Status of the Liquefied Petroleum Gas Industry," by G. G. Oberfell, Phillips Petroleum Co.

Discussion by W. G. Watkins, Skelly Oil Co.

WEDNESDAY EVENING

6:30 p.m.—Membership Dinner Annual meeting, election of officers and directors.

9:00 p.m.—Annual Dance furnished by Natural Gasoline Supply Men's Association.

THURSDAY MORNING, MAY 21, 9:00 A.M.

E. R. Filley, The Texas Company, chairman.

"Modern Developments in Motor Fuels," by George G. Brown, University of Michigan.

Discussion by G. G. Oberfell, Phillips Petroleum Co.

"The Refinery From the Natural Gasoline Man's Viewpoint," by Emby Kaye, Skelly Oil Co.

Discussion.

"Determination of the True Vapor Pressure of Liquids and Its Value in the Petroleum Industry," by E. J. Squire, Shell Oil Co.

Noon—Dutch Lunch furnished by Natural Gasoline Supply Men's Association.

THURSDAY AFTERNOON, 1:30 P.M.

No formal program. This session will be held open for the completion of any unfinished papers or discussion.

LESS GAS WASTED NOW IN CALIFORNIA FIELDS

SAN FRANCISCO, Calif., May 11.—A larger proportion of the gas produced in California was processed through natural gasoline plants during the first two months of 1931, according to data compiled by the California State Railroad Commission. During this period 33,000,000,000 feet was produced per month and consumption averaged 26,000,000,000 feet per month. This left a wastage of 7,000,000,000 feet monthly.

Contrasting with these figures, the output at its peak, reached in October, 1929, was more than 60,000,000,000 feet a month, and the consumption 29,000,000,000 feet—less than half the output, with more than half blowing off into the air.

Generally speaking, the production of natural gas increased with extreme rapidity during the last decade, while utilization gained more steadily, but less rapidly. After the peak production late in 1929, reached when the Kettleman Hills gas output was at its height, and before conservation measures began to have notable effect, the output has been curbed sharply while the consumption continued to gain. This has resulted in cutting down wastage to a little more than one-fifth the high mark.

START OPERATING AIR-BUTANE PLANTS IN WEST

The Natural Gas Corp. of Oregon and the Natural Gas Corp. of Washington have recently started operations at several air-butane gas plants in the two states. The corporations have been rapidly expanding these facilities in small towns in the West Coast States.

Cottage Grove, Ore., received its service last week and similar service at Coquille the first part of May, brings to a conclusion the original 1930 construction program of the company.

Service was inaugurated at Shelton, Wash., on Monday, April 27, immediately followed by service at Port Townsend on Tuesday, April 28. Plants and distribution systems will be completed very shortly at Anacortes and Port Angeles.

A group of Natural Gas Corp. of Oregon and Natural Gas Corp. of Washington officials left the San Francisco headquarters of the company last week to be in attendance at these turn-ons, including Executive Vice President R. E. Aitcheson and Manager of Sales T. E. Bartlett. They were accompanied by H. L. Farrar, in charge of gas and electric utility operations for Standard Management & Operating Corp., which company has been in direct charge of construction work throughout the Bu-Gas properties. General Manager A. E. Strong, from the Portland headquarters, will also be in attendance.

PLANT IN TRINIDAD

NEW YORK, May 9.—Trinidad Petroleum Development Co., Ltd., subsidiary of British Controlled Oilfields, Ltd., has completed a plant for the extraction of light products from its Trinidad production.

SHREVEPORT GEOLOGISTS DISCUSS NOMENCLATURE

SHREVEPORT, La., May 9.—At the final meeting of the Shreveport Geological Society for this season, it was decided to abandon the field trip which had been planned into northeast Texas and to substitute a shorter trip. W. E. Hopper and S. P. Borden, along with the former committee, were appointed by President S. C. Stathers to work out this shorter trip.

The subject of discussion was "Correlation and Nomenclature of Northern Louisiana Formation," opened with a paper by H. K. Shearer, geologist for the Standard Oil Co. of Louisiana and chairman of a local committee for standardizing the names of geological formations of Louisiana and Arkansas. Efforts are now being made to bring about a general standardization of names by the "national stratigraphic nomenclature committee," on which the American Association of Petroleum Geologists has three representatives.

The definitions of geological terms, such as group, formation, member, lens, tongue, zone and horizon, were discussed; using the beds found in Louisiana and surrounding states as examples. The beds of Eocene age outcropping in northwest Louisiana, southwest Arkansas and northeast Texas were given particular consideration. Evidence was presented that the "Recklaw" formation of Texas corresponds to the main body of the Cane River formation of Louisiana, and that the Weches is a tongue of upper Cane River which pinches out into the Sparta sand in Bossier Parish, Louisiana; while the Queen City sand underlying the Weches is a tongue of the lower Sparta.

Members taking part in the discussion were: S. P. Borden, W. E. Hopper, George W. Schneider, L. S. Harlow and others.

The next regular meeting will be the first Friday of October, 1931.

HEWETSON TO HEAD REFINING DEPARTMENT

(Continued from Page 129)

president and treasurer and J. A. Bochtold, vice president and secretary of the company. T. H. Taylor and J. V. Gresham were elected to the board of directors.

Mr. Hewetson, who will have charge of the Baton Rouge refinery of the Louisiana Standard which has a rated capacity of 80,000 bbls. daily, joined the Standard Oil Co. of New Jersey in 1920. His first connection was with the development department at Elizabeth, N. J., and later he was transferred to the Bayway refinery where he served as test engineer and assistant to the superintendent. In 1924, he did special consulting work for the International Petroleum, Ltd., with refineries in Colombia and Peru.

In 1925, he was placed in charge of refinery operations for the Louisiana Oil Refining Corp. with plants at Shreveport, La. He left that company to join the Colonial Beacon Oil Co., a subsidiary of the Standard of New Jersey and later was elected vice president in charge of refinery operations. Under his direction the company's refinery at Everett, Mass., was enlarged and now has a crude oil capacity of 22,000 bbls. daily.

Mr. Skehan has been associated with Standard of New Jersey for the past 29 years. He first entered the company's employ as a junior clerk in the lubricating oil division in 1902 at the Newark office. Six months later he was made a collector in the accounting department and progressed steadily through the sales department becoming a stove, heater and lamp salesman and then handling general specialty sales.

In 1911 he was assigned to cover the motor oil trade in the Newark territory and as the motor oil business grew his acitvities widened until in 1919 he was placed in charge of sales promotion work throughout the entire State of New Jersey. Eighteen months later he was made district manager in Newark and in January, 1926 he succeeded J. A. van Wynen as branch manager for the New Jersey company in Newark.

LANGSTON ELECTED PRESIDENT NATIONAL SCOUTS ASSOCIATION

By L. E. Bredberg

DALLAS, Tex., May 12.—The eighth annual convention of the National Oil Scouts of America was opened at the Adolphus Hotel Monday with a business session and registration taking up the entire morning. This is the second convention held at Dallas, John H. Langston, executive vice president, was in charge of all arrangements, having John G. Pew of the Sun Oil Co., J. H. Selby of the Shell Petroleum Corp., Robert B. Whitehead of the Atlantic Oil Producing Co. and J. M. Charlton of the California Co., as assistants in planning two full days of entertainment and business.

J. Ben Critz of the Dallas Chamber of Commerce welcomed the association, and Robert R. Penn, vice president of the American Petroleum Institute, described the discovery of the East Texas oil field as "the greatest economic catastrophe in the history of the country." He estimated that as a result of East Texas development, the industry faced a loss of $690,000 daily or $350,000,000 during 1931, basing his statement on cuts in prices of crude oil which followed the beginning of production in the new area.

Mr. Penn said the only economic calamity comparable to the East Texas developments was the Chicago fire, in which the total loss was approximately $190,000,000. He attached no blame to citizens of East Texas, pointing out that any new field in any other section would have had the same effect on the industry and probably would have been opened in the same way under similar circumstances.

"At this rate," he said, "I doubt if the average barrel of oil will be brought to the surface and marketed for enough to pay the cost of production. The only hope is to control East Texas production to prevent it from destroying itself and the entire oil industry along with it."

J. V. Adams, of San Antonio, president of the association, declared the oil industry was facing the greatest crisis in its history.

A stag smoker was held Monday evening, a golf tournament Tuesday afternoon, and a dinner dance in the evening.

J. H. Langston, Sun Oil Co., Dallas, was elected president by a unanimous vote, Tom Terry of The Texas Company, San Antonio, being chosen as first vice president in the same manner. Frank McGee, Humble Oil & Refining Co., was elected second vice president, and J. W. Selby, Shell Petroleum Corp., secretary and treasurer. Messrs. Langston and Selby are located at Dallas and will be in best position to carry out the work of the organization for the ensuing year. Claude Strahan, of Atlantic Oil Producing Co., Shreveport, La., was elected chairman of the executive committee.

LEWIS E. LOCKWOOD VICTIM OF PNEUMONIA

OIL CITY, Pa., May 11.—Lewis E. Lockwood, age 55 years, president of the National Transit Co. and its subsidiaries, died Saturday, May 9, after a week's illness of pneumonia.

Mr. Lockwood was born in Randolph, N. Y. He learned telegraphy when a boy and his first work as a pipe line man was as a telegraph operator at Pine Station on the National Transit lines. He was eager to advance himself and studied accounting and was transferred from the telegraph department of the company to its accounting department and worked in the Bradford offices several years. Going to Pittsburgh with the Crescent Pipe Line Co. he became chief accountant in 1908, then assistant treasurer, treasurer, vice president and president of that company. He attended to the details of the dissolution of the Crescent Pipe Line Co. and on May 9, 1928, was made assistant general superintendent of the National Transit Co. On November 1, 1930, he was elected president to succeed F. D. Williams, who had retired, and last week was re-elected.

Mr. Lockwood was an authority on pipe line transportation in all its general phases. He was a director in the First National Bank of Oil City.

Mrs. Lockwood and one son, and the parents of the deceased survive him.

The funeral was held here today. Services were conducted in the Protestant Episcopal Church.

DALE SHUTS DOWN

ELECTRA, Tex., May 12.—The Dale Oil & Refining Co.'s plant has been shut down temporarily due to the weakness of the North Texas refinery market.

ARRO ADDS NEW EQUIPMENT

LEWISTOWN, Mont., May 11.—The Arro Oil & Refining Co. has installed a new reaction chamber and fractionating equipment for its Dubbs units for the purpose of producing gasoline of a higher antiknock value.

ENGLAND TO ENCOURAGE USE OF HYDROGENATION

LONDON, May 10.—The House of Commons has pledged its support to the development of the hydrogenation of coal within the British Isles. An effort will be made to improve the value of tar oils, which are substantial by-products, and it is intended to raise governmental laboratory experiments to small scale commercial production to cover hydrogenation cracking and refining of tar oils. The erection of the necessary plant will cost $167,500 and it will cost $40,000 to maintain it, according to a government spokesman.

The second direction in which the government will aid is in the wider use of smokeless low-temperature fuel. The government, accordingly, is issuing instructions to its departments to use a proportion of this fuel wherever the price is comparable with that of coal. Shipping firms, moreover, will be encouraged by the government to test pulverized fuel under sea-going conditions.

SAFETY MEETING IN HOUSTON

HOUSTON, Tex., May 11.—In connection with the third annual meeting of the Southwestern Safety Conference held here May 8 the Gulf Coast chapter of the Petroleum Safety Council met at luncheon that day for its May meeting. Approximately 65 safety workers attended the luncheon. Presiding was C. H. Hayslip of the Humble Oil & Refining Co., Houston, and speakers included D. J. Wallace of the safety division of the Mid-Continent Oil & Gas Association, Tulsa; H. J. Larsen of Wilson Products, Inc.; H. N. Blakeslee, safety director, American Petroleum Institute, and H. S. Stapleton, Vacuum Oil Co., Lake Charles, La.

SOVIET REWARDS OIL WORKERS

In recognition of outstanding achievements of the Russian oil industry, the Order of Lenin has been awarded to the Azneft (Azerbaidzhan) and Grozneft (Grozny) Oil Trusts, and to 35 individual workers, according to advices to the Amtorg Corp., American representatives of the Soviet. Azneft during March produced 1,112,800 tons of crude, which was 100.8 per cent of its program for the month.

HUMBLE PIPE LINE CO. TO CONTINUE EFFORTS

The Humble Pipe Line Co. has notified the Texas Railroad Commission that it will continue to seek a reduction of 20 per cent in the pipe line tariffs from various West Texas, North Texas and Gulf Coast fields to the Gulf Coast refineries and terminals. The company is thought to be seeking an agreement with its competitors in Texas for lower rates on oil from many Texas, New Mexico and Louisiana fields. Failing this, it is expected an application will be filed for lower rates, the company giving the legal notice of 30 days.

MAY BUILD REFINERY

NEW YORK, May 9.—British American Oil Co., Ltd., with headquarters in Toronto, has completed plans for the construction of a new refinery at East Montreal, Canada, to take care of the company's distribution of refined products in Eastern Ontario and Quebec. The new plant will be located on the St. Lawrence River, and will have a bulk marine terminal capable of handling the largest tankers using the river. The refinery is expected to start operations next fall.

OIL MAN'S CALENDAR

MAY

11-14—Memphis, Tenn., Natural Gas Department, American Gas Association.

14-15—New Orleans, La., American Oil Chemists Society.

14-16—Washington, D. C., American Road Builders Association.

19-21—Tulsa, Okla., Natural Gasoline Association of America, Mayo Hotel.

27-29—New York, National Foreign Trade Council.

28—Warren, Pa., National Petroleum Association, Fire and Safety Marshals.

JUNE

2—Longview, Tex., A.P.I. Board of Directors Oil Field Tour.

2-5—Washington, D. C., 24th National Conference on Weights and Measures, Bureau of Standards.

3-4—A.P.I. Division of Production, Baker Hotel, Dallas, Tex.

5—Fort Worth, Tex., A.P.I. Board of Directors, Texas Hotel.

8-11—Toronto, Canada, National Association of Purchasing Agents, Royal York Hotel.

10-12—Swampscott, Mass., American Institute of Chemical Engineers.

15-18—Madison, Wis., fourth annual oil and gas power meeting, American Society of Mechanical Engineers.

15-19—White Sulphur Springs, W. Va., Summer Meeting, Society of Automotive Engineers.

22-26—Chicago, Annual Meeting, American Society for Testing Materials.

SEPTEMBER

1-3—Cleveland, Ohio, 20th National Aeronautic Meeting, Society of Automotive Engineers.

16-18—Atlantic City, N. J., Annual Meeting, National Petroleum Association, Hotel Traymore.

OCTOBER

2-3—Houston, Tex., Petroleum Division, American Institute of Mining and Metallurgical Engineers.

12-16—Chicago, National Safety Council.

NOVEMBER

10-12—Chicago, Twelfth Annual Meeting, American Petroleum Institute, Stevens Hotel.

16-21—Pittsburgh, Pa., Third International Conference on Bituminous Coal, Carnegie Institute.

DECEMBER

28-31—Tulsa, Geological Society of America, Mayo Hotel.

REFINERY AND CRUDE PRICES

Quotations on refined products are for interstate or export movement unless otherwise noted.

GASOLINE AND NAPHTHA

	May 12		May 5		Apr. 28	
OKLAHOMA (Group 3)—						
50-52 450 endpoint	.02⅞	.03	.02⅞	.03⅛	.03⅛	
56-58 450 endpoint	.02⅝	.03	.02⅞	.03	.03	.03¼
58-60 437 endpoint (U. S. Motor)	.02⅞	.03¼	.03	.03½	.03⅛	.03¾
60-62 437 endpoint	.03	.03¼	.03⅛	.03½	.03¼	.03¾
60-62 400 endpoint	.03¼	.03½	.03¼	.03½	.03⅜	.03½
64-66 375 endpoint	.03⅜	.03¾	.03⅝	.04	.03¾	.04
68-70 360 endpoint	.03⅝	.03¾	.03¾	.04	.04	.04⅛
64-66 437 endpoint (blend)	.02¾	.03	.02⅞	.03	.03	.03¼
NORTH TEXAS—						
50-52 450 endpoint	.02¾	.03	.02⅞	.03	.03⅛	
58-60 450 endpoint	.02¾		.02⅞	.03	.03	
58-60 437 endpoint (U. S. Motor)	.02¾	.03	.03	.03⅛	.03⅛	.03¼
60-62 400 endpoint	.03⅛	.03¼	.03¼	.03½	.03¼	.03½
64-66 390 endpoint	.03¼	.03½	.03⅜	.03¾	.03½	.03¾
64-66 375 endpoint	.03⅜	.03¾	.03½	.04	.03⅝	.04
68-70 360 endpoint	.03½	.04	.03¾	.04	.03⅞	.04⅛
64-66 437 endpoint (blend)	.02¾	.03	.02⅞	.03	.03	.03¼
***NORTH LOUISIANA—**						
58-60 437 endpoint (U. S. Motor)	.03½	.03¾	.03½	.03¾	.03⅝	.03⅞
***ARKANSAS—**						
58-60 437 endpoint (U. S. Motor)	.03½	.03¾	.03½	.03¾	.03⅝	.03¾
PENNSYLVANIA—						
52-54 Naphtha	.05		.05		.05	
54-56 Naphtha	.05		.05		.05	
58-60 Gasoline	.05	.05¼	.05¼		.05¼	
60 Gasoline	.05¼	.05½	.05¼	.05½	.05¼	.05½
62 Gasoline	.05¼	.05½	.05½		.05½	
64 Gasoline	.05½		.06		.06	
68-70 350 endpoint gasoline	.06¼		.06¼		.06½	
CALIFORNIA—						
†54-58 437 endpoint (U. S. Motor) domestic	.03	.03½	.03	.03½	.03	.03½
†58-60 400 endpoint domestic gasoline	.04	.04½	.04	.04½	.04	.04½
CHICAGO DISTRICT (Based on Group 3)—						
50-52 450 endpoint (Naphtha)	.02⅞	.03	.03⅛	.03⅜	.03	.03¼
58-60 437 endpoint (U. S. Motor)	.02⅞	.03⅛	.03⅛	.03½	.03⅛	.03⅜
60-62 400 endpoint	.03⅛	.03½	.03¼	.03⅝	.03¼	.03½
64-66 375 endpoint	.03½	.03¾	.03¾	.04	.03¾	.04
64-66 437 endpoint (blend)	.02¾	.03	.03	.03⅛	.03	.03¼
68-70 360 endpoint	.03⅞	.04⅛	.04	.04⅛	.04	.04⅛
GULF COAST (Export)—						
58-60 U. S. Motor	.04¼		.04½		.04½	
60-62 400 endpoint	.04½		.04⅝		.04⅝	
61-63 390 endpoint	.04¾		.05¼		.05¼	
64-66 375 endpoint	.05		.05½		.05½	

*Louisiana, Arkansas, Mississippi and East Texas delivery. †For local consumption.

NATURAL GASOLINE

	May 12		May 5		Apr. 28	
OKLAHOMA (Group 3)—						
Grade A, 72-79.9, 375 e.p., rec. 90%	.01¾		.01¾		.01¾	.02
Grade AA, 80-87.9, 375 e.p., rec. 90%	.01⅝	.01½	.01½	.01⅝	.01½	.01⅝
Grade B, 76-83.9, 375 e.p., rec. 85%	.01⅝		.01½		.01½	
Grade BB, 84-92, 375 e.p., rec. 85%	.01⅝		.01½		.01½	
Grade C, 80-92, 375 e.p., rec. 78%	.01¼	.01⅜	.01⅝	.01½	.01⅝	.01½
NORTH TEXAS—						
Grade A, 72-79.9, 375 e.p., rec. 90%	.01¾		.01¾		.01¾	.02
Grade AA, 80-87.9, 375 e.p., rec. 90%	.01⅝	.01½	.01½	.01⅝	.01½	.01⅝
Grade B, 7C-83.9, 375 e.p., rec. 85%	.01⅝		.01½		.01½	
Grade BB, 84-92, 375 e.p., rec. 85%	.01⅝		.01½		.01½	
Grade C, 80-92, 375 e.p., rec. 78%	.01¼	.01⅜	.01½		.01½	
NORTH LOUISIANA—						
Grade AA, 80-87, 375 e.p., rec. 90%	.01½	.01⅝	.01¾	.02	.01¾	.02
Grade BB, 84-92, 375 e.p., rec. 85%	.01½		.01⅝	.01¾	.01⅝	.01¾
Grade C, 80-92, 375 e.p., rec. 78%	.01½		.01⅝		.01⅝	
CALIFORNIA—						
75-78 375-390 endpoint	.02½	.03	.02½	.03	.02½	.03
CHICAGO DISTRICT (Based on Group 3)—						
Grade A, 72-79.9, 375 e.p., rec. 90%	.01¾		.01¾		.01¾	.02
Grade AA, 80-87.9, 375 e.p., rec. 90%	.01⅝	.01½	.01½		.01½	.01⅝
Grade BB, 84-92, 375 e.p., rec. 85%	.01⅝		.01½		.01½	

BURNING OIL

	May 12		May 5		Apr. 28	
OKLAHOMA (Group 3)—						
41-43 water white kerosene	.02⅜	.02½	.02½	.02⅝	.02½	.02¾
42-44 water white kerosene	.02½	.02¾	.02⅝	.03	.02¾	.03
NORTH TEXAS—						
41-43 water white kerosene	.02⅜	.02½	.02⅜	.02½	.02½	.02¾
40-41 water white kerosene	.02¼	.02⅜	.02¼	.02½	.02¼	.02½
***NORTH LOUISIANA—**						
41-43 water white kerosene	.02⅞	.03	.03		.03	
***ARKANSAS—**						
41-43 water white kerosene	.02⅞	.03	.03		.03	.03⅛
PENNSYLVANIA—						
43 Kerosene prime white	.04	.04¼	.04⅜		.04⅜	
45 Kerosene water white	.04¼	.04⅜	.04⅝		.04⅝	.04½
46 Kerosene water white	.04½	.04⅝	.04⅝	.04¾	.04⅝	.05
CALIFORNIA—						
38-40 water white Kero. high burning test)	.04	.04½	.04	.04½	.04	.04½
CHICAGO DISTRICT (Based on Group 3)—						
41-43 water white kerosene	.02⅜	.02½	.02½	.02¾	.02½	.02¾
42-44 water white kerosene	.02⅝	.02⅞	.02⅝	.03	.02⅝	.03
GULF COAST (Export)—						
41-43 prime white	.04		.04½		.04½	
44 water white	.05		.05¼		.05¼	

*Louisiana, Arkansas, Mississippi and East Texas delivery.

FUEL OIL

	May 12		May 5		Apr. 28	
OKLAHOMA (Group 3)—						
Below 18 gravity Fuel Oil, per bbl.	.30	.40	.35	.40	.35	.40
18-22 Fuel Oil, per bbl.	.35	.40	.37½	.42½	.37½	.42½
20-22 Fuel Oil, per bbl.	.37½	.42½	.40	.45	.40	.45
22-26 Fuel Oil, per bbl.	.42½	.47½	.45	.50	.45	.50
24-26 Fuel Oil, per bbl.	.45	.50	.47½	.50	.47½	.50
26-30 Fuel Oil, per bbl.	.50	.55	.50	.55	.50	.55
28-30 Fuel Oil, per bbl.	.55	.60	.55	.65	.55	.65
32-36 Gas Oil (industrial)	.01	.01⅛	.01⅛	.01¼	.01⅛	.01¼
32-36 Gas Oil (straw color, high cold test)	.01	.01¼	.01⅛	.01⅜	.01⅛	.01⅜
32-36 Gas Oil (straw color, low cold test)	.01¼	.01½	.01½	.01⅝	.01½	.01⅝
36-38 Distillate	.01⅝	.01¾	.02	.02¼	.02	.02¼
38-40 Straw Distillate	.01¾	.02	.02⅛	.02¼	.02⅛	.02¼

Note—Fuel oils over 40 cold test generally 5 to 10 cents per barrel less.

NORTH TEXAS—						
Below 20 gravity Fuel Oil, per bbl.	.25	.35	.25	.35	.25	.35
24-26 Fuel Oil, per bbl.	.35	.45	.35	.45	.35	.45
32-36 Gas Oil (industrial)	.01	.01⅛	.01	.01¼	.01	.01¼
38-40 Straw Distillate	.01⅝	.01¾	.01⅞	.02	.01⅞	.02
***NORTH LOUISIANA—**						
18-20 Fuel Oil, per bbl.	.55	.60	.55	.60	.55	.60
30-32 Gas Oil (low cold test)	.02⅛	.02¼	.02¼		.02¼	
***ARKANSAS—**						
33-36 Distillate	.02¼	.02½	.02½		.02½	
30-32 Gas Oil	.02	.02⅛	.02⅛	.02¼	.02⅛	.02¼
16-22 Refinery Fuel Oil, per bbl.	.50	.55	.55		.55	
GULF COAST (South Texas)—						
Gas Oil	.03		.03		.03	
Bunker C Fuel (cargo lots), per bbl.	.60	.62½	.60	.62½	.65	.70
Bunker C Fuel (small lots)	.80		.80		.90	
PENNSYLVANIA—						
30-34 Fuel Oil	.02½	.02¾	.02¾	.02⅞	.02¾	.02⅞
36-40 Fuel Oil	.02¾	.03	.02⅞	.03	.02¾	.03
CALIFORNIA—						
30-36 Distillate	.02	.02½	.02	.02½	.02	.02½
26-32 Distillate	.01¾	.02	.01¾	.02	.01¾	.02
15-19 Fuel Oil, Bunker (at tidewater), bbl.	.60	.90	.60	.90	.60	.90
15-19 Fuel Oil (cargo lots, at tidewater), bbl.	.55	.85	.55	.85	.55	.85
†15-19 Fuel Oil, f.o.b. tank cars	.30	.70	.30	.70	.30	.70
27 plus Diesel, per bbl.	.70	.95	.70	.95	.70	.95
30-34 Gas Oil	.70	.95	.70	.95	.70	.95
CHICAGO DISTRICT (Based on Group 3)—						
18-22 Fuel Oil, per bbl.	.35	.40	.35	.40	.35	.40
22-26 Fuel Oil, per bbl.	.40	.45	.37½	.42½	.37½	.42½
28-30 Fuel Oil, per bbl. (zero)	.62½	.67½	.60	.70	.60	.70
32-36 Gas Oil (industrial)	.01	.01¼	.01⅛	.01⅜	.01⅛	.01⅜
32-36 Gas Oil (zero)	.01⅜	.01⅝	.01½	.01¾	.01½	.01¾
38-40 Straw Distillate	.01⅝	.02	.02⅛	.02¼	.02⅛	.02¼

*Louisiana, Arkansas, Mississippi and East Texas delivery. †Lowest priced fuel oil has high sulphur content.

LUBRICATING OIL AND WAX

	May 12		May 5		Apr. 28	
OKLAHOMA (Group 3)—						
100 vis., 2 color, 20-25 cold test	.05		.05		.05	
100 vis., 3 color, 20-25 cold test	.04¾	.05	.04¾	.05	.04¾	.05
150 vis., 3 color, 20-25 cold test	.07	.07½	.07		.07	
150 vis., 4 color, 20-25 cold test	.06	.06½	.06½		.06½	
180 vis., 3 color, 23-28 cold test	.08	.08½	.08½		.08½	
180 vis., 4 color, 23-28 cold test	.07½	.08½	.08		.08	
180 vis., 5 color, 23-28 cold test	.07¼	.07½	.07¼	.07½	.07¼	.07½
200 vis., 3 color, 23-28 cold test	.09½	.10	.09½	.10	.09½	.10
200 vis., 4 color, 23-28 cold test	.09	.09½	.09½		.09½	
200 vis., 5 color, 23-28 cold test	.08	.08½	.08½	.09	.08½	.09
240 vis., 3 color, 25-30 cold test	.11	.11½	.13¼	.13½	.13¼	.13½
240 vis., 4 color, 25-30 cold test	.10	.10½	.12¼	.12½	.12¼	.12½
240 vis., 5 color, 25-30 cold test	.09½	.10	.11¼	.11½	.11¼	.11½
280 vis., 3 color, 25-30 cold test	.12½	.13	.15½		.15½	
280 vis., 4 color, 25-30 cold test	.11½	.12	.14½		.14½	
280 vis., 5 color, 25-30 cold test	.11	.11½	.13½		.13½	
Cylinder Stocks:						
600, steam refined, light green	.04½	.05½	.05	.06	.05	.06
600, steam refined, dark green	.03	.03½	.03½	.04½	.03½	.04½
190-200 vis., D color, Bright Stocks	.18		.20		.20	
150-160 vis., D color, Bright Stocks 0-10 c.t.	.14½	.15	.16	.17	.16	.17
150-160 vis., D color, Bright Stocks 10-25 c.t.	.14	.14½	.15	.16	.15	.16
150-160 vis., D color, Bright Stocks 25-40 c.t.	.14		.14½	.15½	.14½	.15½
150-160 vis., E color, Bright Stocks	.13½	.14	.14	.15	.14	.15
Waxes:						
124-126 White Crude Scale Wax	.01¾	.02	.01¾	.02	.01¾	.02

All bright stock prices are for domestic movement.

PENNSYLVANIA—						
34 Neutral	.05½	.06	.05½	.06	.05¼	
34 Sundebloom	.05¼		.05¼		.05¼	
36 Miners' Neutral	.05½		.05½		.05½	
150, 3 color	.16½	.16¾	.16¾	.17	.16¾	.17
180, 3 color	.18½	.19½	.18½	.19½	.18½	.20½
200, 3 color	.21½	.22	.21½	.22	.21½	.22½
220, 3 color	.24	.26	.24	.26½	.24½	.26½
600, steam refined	.08	.08½	.08¼	.08½	.08¼	.08½
650, steam refined	.11	.12	.11	.12	.11	.12½
600, Pennsylvania Flash	.11½	.12½	.12	.14	.12	.14
630, Pennsylvania Flash	.17¾		.17¾		.17¾	
600, E filtered	.11½	.12½	.11½	.12½	.11½	.13
600, D filtered, Oil City	.15	.17	.15	.17	.17	
Pennsylvania Bright Stocks below 35 c.t.	.17½	.18	.18		.18	.19
Pennsylvania Bright Stocks above 35 c.t.	.17	.17½	.17½	.18	.17½	
*122-124 White Crude Scale Wax	.02	.02⅛	.02	.02⅛	.02¼	.02¼
124-126 White Crude Scale Wax	.02⅛		.02⅛		.02¼	

*At New York.

GULF COAST (South Texas)—						
100 vis., 2-2½ color, pale oil	.05½	.06	.06	.06¼	.06	.06¼
200 vis., 3 color, pale oil	.07¾	.08	.08¼	.08½	.08¼	.08½
300 vis., 3 color, pale oil	.09	.09¼	.09½	.09¾	.09½	.09¾
500 vis., 3½ color, pale oil	.10¼	.10½	.10¾	.11	.10¾	.11
750 vis., 3½ color, pale oil	.11¾	.12	.12¼	.12½	.12¼	.12½
1,200 vis., 3½ color, pale oil	.14¼	.14½	.14¾	.15	.14¾	.15
2,000 vis.. 4 color, pale oil	.15¼	.15½	.15¾	.16	.15¾	.16
200 vis., 5-6 color, red oil	.07	.07¼	.07½	.07¾	.07½	.07¾
300 vis., 5-6 color, red oil	.08¼	.08½	.08¾	.09	.08¾	.09
500 vis., 5-6 color, red oil	.09½	.09¾	.10	.10¼	.10	.10¼
750 vis., 5-6 color, red oil	.10½	.11¼	.11	.11¾	.11	.11¾
1,200 vis., 5-6 color, red oil	.13¼	.13½	.13¾	.14	.13¾	.14
2,000 vis., 6 plus color	.15¼	.15½	.15¾	.16	.15¾	.16

REFINERY AND CRUDE PRICES

Quotations on refined products are for interstate or export movement unless otherwise noted.

CALIFORNIA—						
130 vis., 2½-3 color	.09	.09½	.09	.09½	.09	.09½
200 vis., 2½-3 color	.10	.10¾	.10	.10¾	.10	.10¾
300 vis., 3-3½ color	.10¾	.11½	.10¾	.11½	.10¾	.11½
350 vis., 3½-4 color	.11½	.11¾	.11½	.11¾	.11½	.11¾
400 vis., 3½-4 color	.12¼	.12¾	.12¼	.12¾	.12¼	.12¾
Red Neutral:						
200 vis., 4½-5 color	.09½	.10	.09½	.10	.09½	.10
300 vis., 5-6 color	.10¼	.10¾	.10¼	.10¾	.10¼	.10¾
400 vis., 5-6 color	.11	.12	.11	.12	.11	.12
500 vis., 4½-5 color	.12¼	.13	.12¼	.13	.12¼	.13
500 vis., 5-6½ color	.12	.12¾	.12	.12¾	.12	.12¾
600 vis., 6½ plus color	.13	.14	.13	.14	.13	.14

Note—Bright Stocks are not manufactured commercially on the Pacific Coast.

NEW YORK (BAYONNE) REFINERY PRICES

	May 12		May 5		Apr. 28	
Gasoline, U. S. Motor, 58-60, 437 e.p.	.06	.06½	.06	.06½	.06¾	.07½
Kerosene, water white, 41-43	.05¼	.05¾	.05¾	.06	.05¾	.06
*Fuel Oil, Bunker "C," 41-43	.95		.95		.95	
†Fuel Oil, Diesel, 28-30, per bbl.	1.65		1.65		1.75	
Gas Oil, 28 gravity plus	.04		.04¼	.04¾	.04¼	.05¼
25 pale Paraffin Oil, tank car	.10½		.10½		.10½	
28 pale Paraffin Oil, tank car	.07½		.07½		.07½	
280 red Paraffin Oil, tank car	.12½		.12½		.12½	
250 red Paraffin Oil, tank car	.11½		.11½		.11½	
225 red Paraffin Oil, tank car	.10		.10		.10	
200 red Paraffin Oil, tank car	.09¼		.09¼		.09¼	
Domestic heating oil, min. 32 grav., tank car	.04		.04		.04½	
Refined Wax:						
120-122 a.m.p., per lb.	.03		.03		.03	
125-127 a.m.p., per lb.	.03½		.03½		.03½	
130-132 a.m.p., per lb.	.03⅝		.03⅝		.03⅝	
133-135 a.m.p., per lb.	.04¼		.04¼		.04¼	
135-137 a.m.p., per lb.	.04⅝		.04⅝		.04⅝	
Petrolatum in barrels in carload lots, per pound:						
Dark Green	.01¾		.01¾		.01¾	
Amber	.03		.03		.03	
Extra Amber	.03¼		.03¼		.03¼	
Cream	.06		.06		.06	
Lily White	.06¾		.06¾		.06¾	
Snow White	.08		.08		.08	

*Lighterage 5 cents a barrel extra. †Lighterage 6.5 cents a barrel.

NEW YORK (BAYONNE) EXPORT PRICES

	May 12		May 5		Apr. 28	
600, steam refined cylinder stocks, in bbls.	.16	.16¼	.16	.16¼	.16	.16¼
635, steam refined	.16½	.17	.16½	.17	.16½	.17
650, steam refined	.19	.20	.19½	.20	.19½	.20
600, Pennsylvania Flash	.20	.21	.20	.21	.20	.21
630 Pennsylvania Flash	.25¾	.26	.26		.26	
600, Warren E	.19½		.20		.20	
600, Oil City E	.18½		.19		.19	
Light 140-150 Bright Stocks	.25	.26	.25	.26	.25	.26
Dark 140-150 Bright Stocks	.24	.25	.23½	.24	.23½	.24

LOS ANGELES EXPORT PRICES

	May 12		May 5		Apr. 28	
Kerosene, water white	.04	.04½	.04	.04½	.04¼	.05
*U. S. Motor Gasoline, 53-55, 437 e.p.	.03½	.04½	.03½	.04½	.03½	.04¼
*58-62, 400 endpoint gasoline	.04	.04½	.04	.04½	.04	.05

*For coastwise shipment.

CRUDE OIL PRICES

OKLAHOMA, KANSAS, NORTH AND EAST CENTRAL TEXAS

Rusk County, Tex.* (Apr. 6, 1931) ....$ .25
East Texas (May 9, 1931)‡ ..... .40
Corsicana heavy (Apr. 23, 1931)† ..... .38
Other fields .....See gravity table

*Posted by Panola Pipe Line Co. For Humble Oil & Refining Co. and Magnolia Petroleum Co. posted prices on East Texas, see gravity table. †Magnolia Petroleum Co. ‡Tidal Refining Co.

TEXAS PANHANDLE

Gray County, Wheeler County and Carson-Hutchinson Counties..See gravity table

WEST TEXAS

Iatan* .....Same as North Texas
Crane - Upton - Crockett, Howard and Glasscock and Ector (Apr. 21, 1931)†.$ .30
Winkler and Pecos, Tex. (Apr. 21, 1931)† .35
Lea County, N. Mex. (Apr. 21, 1931) .. .325

*Includes Westbrook Field. †Posted by Humble Oil & Refining Co.

ARKANSAS-NORTH LOUISIANA

Smackover (all grades) (Mar. 10, 1931).$ .45
Carterville, Sarepta and Cotton Valley, below 36 gravity .....See gravity table
March 10, 1931 ..... .45
Urania (Oct. 30, 1930) ..... .75
Calion, heavy (Mar. 10, 1931) ..... .45
East El Dorado (Mar. 10, 1931) ..... .45
Other fields .....See gravity table

Note—Smackover and Bellevue posted by Standard Oil Co. of Louisiana and Magnolia Petroleum Co.; Urania posted by Louisiana Oil Refining Corp.; East El Dorado posted by Gulf Refining Co. and Magnolia Petroleum Co.; Calion posted by Gulf Refining Co.

GULF COAST

Grade A (April 21)* .....$ .70
Grade B, 25° and upward—See gravity table
Jennings, La. (Apr. 21, 1931)† ..... .75
Refugio, light .....Same as Grade B
Refugio, heavy (Jan. 14)* ..... .69
Markham (Mar. 10, 1931)‡ ..... .50
High Island (Apr. 21, 1931)† ..... .65
Hankamer (Apr. 21, 1931)† ..... .65

*Humble Oil & Refining Co. †Gulf Refining Co. of Louisiana. ‡Texas Pipe Line Co.

ROCKY MOUNTAIN STATES
Ohio Oil Co.-Midwest Refining Co.

Iles (Mar. 7, 1931):
33 gravity and above .....$ .72
Under 33 gravity ..... .50
Fort Collins (Mar. 5, 1931) ..... .58
Florence (Mar. 5, 1931) ..... .47
Wellington (Mar. 5, 1931) ..... .48
Dutton Creek (Oct. 28, 1930) 1.01
Rock Creek, Wyo. (Mar. 5, 1931) ..... .66
Salt Creek .....See gravity table
Big Muddy (Mar. 5, 1931) ..... .65
Grass Creek, heavy (July 27, 1928) .... .90
Grass Creek, light (Mar. 5, 1931) ..... .90
Elk Basin (Mar. 5, 1931) ..... .90
Lance Creek (Mar. 5, 1931) ..... .98
Poison Spider (Mar. 5, 1931) ..... .70
Notches (Mar. 14, 1927) ..... .65
Hudson (Mar. 5, 1931) ..... .35
Lander (Mar. 5, 1931) ..... .40
Rex Lake (Feb. 22, 1930) 1.10
Osage (Apr. 15, 1931)..... .98
Lost Soldier (Mar. 5, 1931) ..... .55
Hamilton Dome (Mar. 14, 1927) ..... .85
Greybull (Oct. 28, 1930) 1.25
Torchlight (Oct. 28, 1930) 1.25
Cat Creek (Mar. 5, 1931) ..... .90
Ponders (Mont.) (Mar. 12, 1931) 1.00
Sunburst (Mont. (Mar. 12, 1931) 1.10
Hogback (N. Mex.) (Mar. 5, 1931) 1.05
Artesia (N. Mex.) (Mar. 10, 1931) ..... .40
Lea County, N. Mex. (Apr. 21, 1931) .. .325
Border, Mont. 1.55
Red Coulee, Alberta 1.55

Note—Salt Creek, Cat Creek, Dallas-Derby, Hudson, Greybull and Hogback posted by Midwest Refining Co. and the remainder by the Ohio Oil Co. Both companies posted Grass Creek light and Elk Basin, Lost Soldier posted by Producers & Refiners Corp. Artesia posted by Continental Oil Co. Border and Red Coulee posted by Imperial Refining Co. Ohio Oil Co. ceased posting Artesia on March 5, 1931. Lea County posted by Humble Oil & Refining Co. Fort Collins, Wellington, Orchard, Florence, Rattlesnake and Table Mesa by the Continental Oil Co. Osage posted by Arro Oil & Refining Co.

SOUTH CENTRAL AND SOUTHWEST TEXAS

Darst Creek (Apr. 21, 1931)* .....$ .53
Luling (Apr. 22, 1931)† ..... .38
Mirando (Apr. 21, 1931)* ..... .60
Pettus (Apr. 21, 1931)* ..... .75
Salt Flat (Apr. 21, 1931)* ..... .53
Thrall‡ .....
Lytton Springs (Lockhart) .See gravity table
Dobrowolski (Oct. 25, 1930)¶ .....
Same as Mid-Continent gravity scale up to and including 28-28.9° at 1.01
Somerset (Oct. 25, 1930)¶ .....
Same as Mid-Continent gravity scale up to and including 38-38.9° at 1.01

*Posted by Humble Oil & Refining Co †Magnolia Petroleum Co. ‡Thrall prices same as North Central Texas less 19¼ cents per cwt. freight. ¶Grayburg Oil & Refining Co., Pioneer Oil & Refining Co. and Texas Petroleum Products Co. ‖Pioneer Oil & Refining Co.

EASTERN STATES
Joseph Seep Purchasing Agency
(Effective April 23, 1931)

Penna Grade Oil in National Transit Lines (Pennsylvania) $1.75
Penna Grade Oil in Southwest Pennsylvania Lines (Pennsylvania) 1.70
Pennsylvania Grade Oil in Southwest Pennsylvania Lines (Apr. 27, 1931).. 1.60
Penna Grade Oil in Eureka Pipe Line Lines (West Virginia) 1.50
Penna Grade Oil in Buckeye Pipe Line Lines (Ohio) (Sept. 14, 1930) 1.35
Corning Grade Oil in Buckeye Pipe Line Co.'s Line (Mar. 11, 1931) ..... .80

(Continued on Page 134)

CRUDE OIL GRAVITY TABLE

Gravity—	1 Oklahoma, Kansas, East Central Texas	2 Ranger, North Texas and Cooke County, Texas	3 East Texas	4 North Louisiana and Arkansas	5 Carson and Hutchinson Counties, Texas	6 Gray County, Texas	7 Grade B Gulf Coast and Refugio, Texas	8 Salt Creek, Wyoming	9 Stephens, Arkansas
Below 25	....	....	....	....	....	....	.60	....	....
25 to 25.9	....	....	....	....	....	....	.61	....	....
26 to 26.9	....	....	....	....	....	....	.63	....	....
27 to 27.9	....	....	....	....	....	....	.65	....	....
28 to 28.9	....	....	....	....	....	....	.67	....	....
Below 29	.43	.33	.43	.43	....	....	....	....	.54
29 to 29.9	.45	.35	.45	.45	....	....	.69	.45	.56
30 to 30.9	.47	.37	.47	.47	....	....	.71	.47	.63
31 to 31.9	.49	.39	.49	.49	....	....	.73	.49	.66
32 to 32.9	.51	.41	.51	.51	....	....	.75	.51	.70
33 to 33.9	.53	.43	.53	.53	....	....	.77	.53	....
34 to 34.9	.55	.45	.55	.55	.30	.33	.79	.55	....
35 to 35.9	.57	.47	.57	.57	.32	.35	.81	.57	....
36 to 36.9	.59	.49	.59	.59	.34	.37	....	.59	....
37 to 37.9	.61	.51	.61	.61	.36	.39	....	.61	....
38 to 38.9	.63	.53	.63	.63	.38	.41	....	....	....
39 to 39.9	.65	.55	.65	.65	.40	.43	....	....	....
40 and above	.67	.57	.67	.67	.42	.45	....	....	....

Column 1—Stanolind Crude Oil Purchasing Co. posted above prices on March 5, effective in Kansas, Oklahoma and East Central Texas, where it purchases oil. Magnolia Petroleum Co. posted same day but with these differences: Below 26 degrees, 40 cents; 26-26.9 degrees, 41 cents; 27-27.9 degrees, 42 cents; 28-28.9 degrees 43 cents. Tidal Refining Co. and Tidal-Western Oil Corp. adopted new price schedule March 5. Mid-Continent Petroleum Corp., Continental Oil Co., H. F. Wilcox Oil & Gas Co., Eason Oil Co., Standard Oil Co. of Kansas, Sinclair Refining Co., White Eagle Oil Corp. and Producers Oil Co. met the price on March 6, Champlin Refining Co. on March 7, Carter Oil Co., The Texas Company, Humble Oil & Refining Co., Empire Pipe Line Co., Gypsy Oil Co. and Gulf Pipe Line Co. met Stanolind prices on March 10, Pure Oil Co. posted same schedule in Van, Texas, Pool, March 5.

Column 2—Posted by Humble Oil & Refining Co., April 21. Met by Stanolind Crude Oil Purchasing Co., Gulf Pipe Line Co., Tidal Western Oil Co., Continental Oil Co., April 21. By The Texas Company and Magnolia Petroleum Co., April 23. Effective May 9, 1931, in Wichita County only, the Tidal Western Oil Corp. posted a new price schedule as follows: Below 34 degrees, 33 cents; 34 degrees, 35 cents, with 2 cents added for each degree up to and including 40 degrees and above at 47 cents.

Column 3—Magnolia Petroleum Co., March 26, 1931; Humble Oil & Refining Co. April 21, 1931, Gulf Pipe Line Co., April 21, 1931, Sinclair Refining Co., May 12, 1931. Effective May 9, 1931, Tidal Refining Co. posted a flat price of 40 cents per barrel for East Texas crude oil.

Column 4—Standard Oil Co. of Louisiana and The Texas Company posted March 16. Standard prices apply to Caddo, Homer, Haynesville, Bull Bayou, Sabine, Crichton, De Soto, El Dorado, Cotton Valley, Sarepta and Carterville.

Column 5—Humble Oil & Refining Co., April 21. Other buyers met price effective April 21.

Column 6—Humble Oil & Refining Co., March 21. Other buyers met price effective April 21.

Column 7—Humble Oil & Refining Co., March 21. Gulf Pipe Line Co. met price effective April 21.

CALIFORNIA CRUDE OIL PRICES

(Posted by Union Oil Co. March 30 and the Standard Oil Co. of California March 31)

	Alamitos Hts., Signal Hill, Seal Beach, Torrance, Athens, Rosecrans, Dominguez, Santa Fe Springs, Montebello, Huntington Beach, East Coyote, Richfield, Brea-Olinda	Santa Paula	Orcutt	Coalinga, McKittrick, Kern River, Midway-Sunset, Elk Hills, Buena Vista Hills, Lost Hills
11 to 13.9	....	....	....	$.50
14 to 14.9	$.65	$.60	$.55	.55
15 to 15.9	.65	.60	.55	.55
16 to 16.9	.65	.60	.55	.55
17 to 17.9	.65	.60	.55	.55
18 to 18.9	.65	.60	.55	.55
19 to 19.9	.65	.60	.55	.55
20 to 20.9	.65	.58	.53	.53
21 to 21.9	.62	.56	.51	.51
22 to 22.9	.59	.53	.49	.49
23 to 23.9	.56	.50	.47	.47
24 to 24.9	.53	.47	.45	.45
25 to 25.9	.50	.44	.43	.43
26 to 26.9	.47	.41	.41	.41
27 to 27.9	.44	.38	.39	.39
28 to 28.9	.41	.35	.37	.37
29 to 29.9	.38	....	.35	.35
30 to 30.9	.35	....	....	....

For the time being the Union Oil Co. and the Standard Oil Co. will not post a schedule of crude oil prices for the Playa del Rey and Kettleman Hills Fields.

TANK WAGON MARKETS

Tank wagon quotations for gasoline and kerosene in United States as furnished by the larger marketing concerns May 12

ALL TANK WAGON AND SERVICE STATION QUOTATIONS INCLUDE TAXES

STANDARD OIL CO (INDIANA)

	Gasoline: Tank wagon	Gasoline: Service station	Gasoline: Incl'ds tax of	Kero. tank wagon
Chicago	14.0	14.0	3.0	9.0
Decatur, Ill.	14.4	14.4	3.0	9.0
E. St. Louis	13.7	13.7	3.0	8.2
Joliet	14.4	14.4	3.0	9.0
Peoria	14.4	14.4	3.0	9.0
Quincy	14.2	14.2	3.0	8.8
Davenport, Ia.	14.5	14.5	3.0	9.3
Des Moines	14.5	14.5	3.0	9.3
Keokuk	14.5	14.5	3.0	9.3
Sioux City	14.1	14.1	3.0	8.9
Duluth, Minn.	15.5	15.5	3.0	9.9
Mankato	15.1	15.1	3.0	9.7
Minneapolis	15.2	15.2	3.0	9.9
La Crosse, Wis.	14.2	14.2	4.0	10.0
Milwaukee	15.1	15.1	4.0	8.9
Madison	15.3	15.3	4.0	9.1
Detroit, Mich.	14.8	14.8	3.0	10.7
Grand Rapids	14.7	14.7	3.0	10.6
Saginaw	14.9	14.9	3.0	10.8
Evansville, Ind.	15.1	15.1	4.0	9.9
Indianapolis	15.3	15.3	4.0	10.1
South Bend	15.4	15.4	4.0	10.2
Fargo, N. D.	16.9	16.9	5.0	11.9
Huron, S. D.	16.3	16.3	4.0	10.7
Sioux Falls	15.8	15.8	4.0	10.4
K. C., Mo.	13.9	13.9	3.0	7.6
Springfield*	13.9	13.9	3.0	8.5
St. Louis*	12.9	12.9	2.5	8.3
St. Joseph	13.5	13.5	3.0	7.5
Wichita, Kans.	12.8	12.8	3.0	7.8
Bartlesville, Okla.	13.0	16.0	5.0	7.5

*State tax 2 cents, remainder city tax.

A third grade of gasoline "Stanolind Blue" is sold at all major points at a price 2 cents or more below the price on the regular grade.

Effective April 15—Discounts on Q.D.A. on 1,000 gallons or more per month throughout territory: Red Crown Ethyl gasoline, 3 cents off tank wagon price; Red Crown gasoline, 2½ cents off tank wagon price; Stanolind Blue gasoline, 1 cent off tank wagon price.

Discount in Chicago division on 1,000 gallons or more per month: Red Crown Ethyl gasoline, 4 cents off tank wagon price; Red Crown gasoline, 3½ cents off tank wagon price; Stanolind Blue gasoline, 2 cents off tank wagon price.

Discounts on resellers authorized agent's agreement: Same amounts as above except made off service station price instead of tank wagon price.

PACIFIC COAST TERRITORY

	Gasoline: Wh'la'e price	Gasoline: Retail* price	Gasoline: Incl'ds tax of	Kero. tank wagon
Fresno	14 0	11.0	3.0	17.0
San Francisco	12.0	11.0	3.0	15.5
Los Angeles	11.5	10.5	3.0	15.5
Reno, Nev.	20.0	20.0	4.0	19.0
Portland, Ore.	14.5	13.5	4.0	16.5
Seattle, Wash.	14.0	13.0	5.0	16.5
Tacoma	14.0	13.0	5.0	16.5
Spokane	21.0	20.0	5.0	20.5
Phoenix, Ariz.	18.5	20.0	5.0	20.0

Above prices are at company's plant or depots as company does not operate stations. A 4-cent per gallon discount is given dealers and customers taking tank wagon lots except in Phoenix where the discount is 2 cents plus a 2-cent special temporary discount subject to withdrawal at any time.

*Retail prices posted by Standard Stations, Inc., a subsidiary.

SOUTHERN DISTRICT

Standard Oil Co. (Kentucky)

	Gasoline: Tank wagon	Gasoline: Service station	Gasoline: Incl'ds tax of	Kero. tank wagon
Atlanta, Ga.	18 0	18 0	6.0	12 5
Augusta	18.0	20 0	6 0	14.0
Macon	18.0	18.0	6.0	13.0
Savannah	18 0	18 0	6.0	12 0
Birm'ham, Ala.	17 0	19 0	5.0	13.0
Mobile	17.0	19 0	4.0	13 0
Montgomery	17 0	17.0	4.0	13.5
Clarks'le, Miss.	18 0	20 0	5.0	13 5
Jackson	15.0	13.0	5.0	11.0
Natchez	18 0	20.0	5.0	13.5
Gulfport	16.0	16 0	5 0	13.5
Vicksburg	16 0	18.0	5.0	11.0
Jack'ville, Fla.	15.0	17.0	6.0	12.0
Miami	18 0	20.0	6 0	13 0
Pensacola	16.0	18 0	6.0	13 0
Tampa	17.0	17 0	5.0	13.0
Lexington, Ky.	17 0	18 0	5.0	13.0
Covington	16 0	17.0	5.0	11.0
Louisville	16.0	17 0	5.0	11 0
Ashland	17 0	19 0	5.0	13.0
Paducah	17.0	18.0	5.0	11.0
Bowling Green	19 0	21 0	5.0	14.5
Corbin	18.0	19.0	5.0	15.0

A third grade, "Kyso Green," is sold at a price generally 2 cents below the price on the regular grade.

In addition to the state tax of 4 cents on gasoline, Montgomery has city tax of 1 cent on gasoline and one-half cent on kerosene. Kerosene prices in Georgia include 1-cent tax. In Florida, an inspection fee of 0.125 cent; in Alabama, an inspection fee of one-half cent on kerosene and one-fourth cent on gasoline. To Pensacola, Montgomery, Birmingham and Mobile state taxes add 1-cent levy tax. To Gulfport state tax add privilege tax of 2 cents.

Effective April 2, price to dealers 2 cents under posted tank wagon price.

NEW YORK AND PART OF NEW ENGLAND DISTRICT

Standard Oil Co. (New York)

	Gasoline: Tank wagon	Gasoline: Service station	Gasoline: Incl'ds tax of	Kero. tank wagon
Albany, N. Y.	16 6	17 6	2 0	15 6
New York*	15 3	15 3	2.0	14.3
Buffalo	15 8	15.8	2 0	14.8
Rochester	16 0	16.0	2 0	14 0
Syracuse	16.8	16 8	2 0	14 8
Boston, Mass.	16.5	16.5	3.0	13.5
Augusta, Me.	13 8	13 8	4 0	14.8
Manch'tr, N. H.	13 4	13.4	4 0	14.0
Burlington, Vt.	19 3	19 3	4 0	15.3

*Prices in steel barrels.

NAPHTHA

	Tank wagon	Tank car
Oleum spirits		
V.M.&P. naphtha	14.0	9 5
Cleaners' naphtha	16 2	11.0
Stanisol	16.2	11.0

Tank wagon prices f.o.b. Chicago; tank car prices f.o.b. Whiting.

STANOLIND FURNACE OIL IN CHICAGO

All dumps of 50 gallons or more..... .07

Note—Outside Chicago furnace oils discount of 1 cent per gallon is given on deliveries of 100 to 349 gallons and 1½ cents on deliveries of 350 gallons or more.

ATLANTIC COAST DISTRICT

Standard Oil Co. (New Jersey)

	Gasoline: Tank wagon	Gasoline: Service station	Gasoline: Incl'ds tax of	Kero. tank wagon
Atl'tic City, N.J.	13.7	15.7	3.0	11.5
Newark	12.7	14.7	3.0	10.5
Annapolis, Md.	15.2	16.2	4.0	11.0
Baltimore	14.4	15.4	4 0	9.5
Cumberland	16.2	17.2	4.0	12.0
Wash'gton, D.C.	13.9	13.9	2.0	10.0
Danville, Va.	17.0	18.0	5.0	11.5
Norfolk	15.5	16.5	5.0	10.0
Petersburg	16 5	17.5	5.0	11.3
Richmond	15.9	16.9	5.0	10.7
Roanoke	17.2	18.2	5.0	12.0
Charles'n, W.Va.	15.7	16.7	4.0	11.5
Keyser	16.3	17.3	4.0	12.1
Parkersburg	14.4	15.4	4 0	10.2
Wheeling	15.6	16.6	4.0	11.4
Charlotte, N. C.	18.5	19.5	6.0	11.0
Hickory	18.8	19.8	6.0	12.6
Mt. Airy	18.7	19.7	6.0	12.5
Raleigh	18 4	19.4	6.0	12.2
Salisbury	18.7	19.7	6.0	12.5
Charleston, S.C.	16.5	17.5	6.0	10.3
Columbia	18.4	19.4	6.0	12.2

A 2-cent per gallon discount off the gasoline tank wagon price is offered to dealers, except in Washington, D. C., and in Maryland where discount is 3 cents.

PENNSYLVANIA-DELAWARE AND PART OF NEW ENGLAND

Atlantic Refining Co.

	Gasoline: Tank wagon	Gasoline: Service station	Gasoline: Incl'ds tax of	Kero. tank wagon
Pittsburgh, Pa.	*12.0	*14.0	...	12.0
Philadelphia	*12.0	*14.0	...	12.0
Scranton	*12.0	*14.0	...	12.0
Allentown	*12.0	*14.0	...	12.0
Altoona	*12.0	*14.0	...	12.0
Erie	*12.0	*14.0	...	12.0
Dover, Del.	15.0	17.0	3.0	12.0
Wilmington	15.0	17.0	3.0	12.0
Springf'd, Mass.	14.5	16.5	2.0	11.0
Fall River	14.1	16.1	...	11.0
Worcester	14.3	16.3	2.0	11.0
Boston	13.5	15.5	2.0	11.0
Providence, R.I.	13.7	15.7	2.0	11.0
Hartford, Conn.	14.5	16.5	2.0	10.0
New Haven	14.6	16.6	2.0	10.0

*Does not include tax of 3 cents in Pennsylvania. Pennsylvania tax is collected by the dealer and paid by him direct to the State. Atlantic Refining Co. recognizes a 2-cent per gallon discount on gasoline from its posted tank wagon markets on sales to dealers for purpose of resale. Atlantic Refining Co. also recognizes a maximum discount of 2 cents per gallon on gasoline to commercial accounts under contract for one year.

SOUTHWESTERN DISTRICT

Magnolia Petroleum Co.

	Gasoline: Tank wagon	Gasoline: Service station	Gasoline: Incl'ds tax of	Kero. tank wagon
Dallas, Tex.	15.0	18 0	4 0	10 0
Fort Worth	12 0	14 0	4 0	10.0
Houston	14.0	18.0	4 0	11.0
San Antonio	14 0	18 0	4 0	10 0
El Paso	14.0	18.0	4 0	12.0
Texarkana	16 0	16.0	4 0	11.0
Muskogee, Okla.	13.0	16.0	5.0	8 0
Okla. City	11 0	13 0	5 0	8 0
Tulsa	11 0	13 0	5.0	8 0
Ft. Smith, Ark.	15 5	16 5	5 0	11.0
Little Rock	16.5	17.5	6.0	11.0

One-cent rebate made from posted station prices to cash purchasers in Louisiana, Arkansas and Tennessee.

ROCKY MOUNTAIN DISTRICT

Continental Oil Co.

	Gasoline: Tank wagon	Gasoline: Service station	Gasoline: Incl'ds tax of	Kero. tank wagon
Denver, Colo.	15.0	18.0	4.0	12.5
Pueblo	14.0	17.0	4.0	12.0
Grand Junction	16.0	19.0	4.0	14.5
Casper, Wyo.	15.0	18.0	4.0	10.0
Cheyenne	16.0	19.0	4.0	11.5
Butte, Mont.	17.0	20.0	5.0	16.0
Billings	20.0	23.0	5.0	14.5
Great Falls	20 0	23.0	5.0	16.0
Helena	20.0	23.0	5.0	16.0
S'lt Lake, Utah*	17.0	20.0	3.5	16.0
Albu'que, N. M.	16.0	20.0	5.0	14.0
Boise, Idaho†	20.5	...	5 0	18.0
Twin Falls‡	20.5	....	5.0	18.0

†Less 2 cents. ‡Less 3½ cents.

CENTRAL SOUTH DISTRICT

Standard Oil Co. (Louisiana)

	Gasoline: Tank wagon	Gasoline: Service station	Gasoline: Incl'ds tax of	Kero. tank wagon
N. Orleans, La.*	15.5	16.5	5.0	12.0
Baton Rouge	15.5	16.5	5 0	12.0
Alexandria†	16.5	17.5	6.0	12.0
Lafayette*	16.5	17.5	6.0	12.0
Lake Charles*	16.5	17.5	6.0	12.0
Shreveport	15.5	16.5	5.0	12.0
Knoxville, Tenn.	18 0	19.0	5.0	13.5
Memphis	15.0	16.0	5.0	10.0
Chattanooga	17.5	18.5	5.0	13.0
Nashville	17.0	18.0	5.0	12.5
Bristol	18.5	19.5	5.0	14.0
Lt. Rock, Ark.	16.5	17.5	6.0	11.0

*Includes city tax of 1 cent. Louisiana kerosene prices include 1-cent state tax. New Orleans kerosene price also includes 1-cent city tax.

†Gasoline price at Alexandria includes 1-cent tax in parish of Rapides.

Two-cent discount off gasoline tank wagon price to dealers and commercial accounts.

OHIO

Standard Oil Co. (Ohio)

	Gasoline: Tank wagon	Gasoline: Service station	Gasoline: Incl'ds tax of	Kero. tank wagon
Ohio points*	15.0	16.0	4.0	†13.0

*Dealers and commercial accounts 2 cents under tank wagon.

†Service station price 14 cents.

NEBRASKA

Standard Oil Co. (Nebraska)

	Gasoline: Tank wagon	Gasoline: Service station	Gasoline: Incl'ds tax of	Kero. tank wagon
Omaha	12.9	12.9	4.0	9.25
McCook	16.00	17.75	4.0	10.75
Norfolk	15.75	16.75	4.0	9.75
N. Platte	16.75	17.75	4.0	10.50
Scottsbluff	16.00	16.00	4.0	10.25

Note—Dealers' discounts allowed as follows: Red Crown Ethyl, 3 cents off station price; Red Crown, 2½ cents off station price; third grade, 1 cent off station price.

TANK WAGON CHANGES

Standard Oil Co. of California reduced the gasoline wholesale price 1 cent in Seattle, Wash., and Tacoma, Wash., making each 16 cents, May 2. On May 5 the wholesale prices were reduced 2 to 3 cents throughout California, Nevada, Washington and Oregon as shown in the accompanying table.

Standard Stations, Inc., reduced the gasoline retail price 1 cent in Portland, Ore., Tacoma, Wash., and Seattle, Wash., May 4. On the same date the gasoline retail price was advanced 1 cent in Reno, Nev.

Magnolia Petroleum Co. advanced the regular gasoline 2 cents to 13 cents in Tulsa May 12.

CRUDE OIL PRICE CHANGES

The Tidal Western Oil Corp., effective May 9, posted new prices in Wichita County, Texas, as follows: Below 34° 33 cents; 34° 35 cents, with 2 cents for each degree upward to and including 40° and above at 47 cents.

The Tidal Refining Co., effective May 9, posted a flat price of 40 cents per barrel for crude oil in the East Texas Field (Kilgore, Joiner and Lathrop Pools).

The Sinclair Refining Co., effective May 12, met the Magnolia-Humble-Gulf prices in East Texas as follows: Below 29° 43 cents; 29° 45 cents, with 2 cents added for each degree upward to and including 40° and above at 67 cents.

LOWER DIESEL OIL PRICES

NEW YORK, May 11.—Standard Oil Co. of New Jersey announces reductions of 10 cents per barrel in Diesel oil prices at various ports as follows: Halifax, $1.90; Montreal, $2.05; Baytown, Houston, Galveston and Refining Co., $1.50. All these reductions are retroactive to May 5, on which date Diesel oil prices were lowered at Atlantic Coast ports.

HIGHER MEXICAN TAX

EL PASO, Tex., May 12.—The Mexican government is considering placing a prohibitive import duty on gasoline with the view of enabling the refineries at Tampico to compete in the Juarez and Chihuahua City marketing territories. If the measure passes, it will probably lessen the volume of gasoline supplied from the local refineries and from California.

DRUMRIGHT CHAPTER MEETING

Drumright, Okla., Chapter of the American Petroleum Institute Division of Production will hold its monthly meeting in the Community Hall, Drumright, at 7:30 p.m., May 19. H. D. Collins of the Gypsy Oil Co., Tulsa, will talk on the "Care and Use of Sucker Rods and Equipment," and will supplement his talk with several reels of films showing the manufacturing process of sucker rods.

CRUDE OIL PRICES

(Continued from Page 133)

Ragland Grade Oil in Cumberland Pipe Lines (Kentucky)	1.10
Wayne District Oil in Cumberland Pipe Lines	1.17

Tide Water Pipe Co.

Bradford district (Apr. 23, 1931)	$2.00
Allegany district (Apr. 23, 1931)	2.00

Pure Oil Co.

Cabin Creek, W. Va. (Apr. 23, 1931)	$1.50
Kelly Creek, W. Va. (Apr. 23, 1931)	1.50
Bradford Hollow, W. Va. (Apr. 23, 1931)	1.50

MIDDLE WESTERN STATES

Ohio Oil Co.
(Effective Mar. 6, 1931)

Lima	$ .90
Wooster	.99
Illinois	.80
Indiana	.50
Princeton	.80
Plymouth	shut in
Western Kentucky	.75
Midland, Mich.* (Mar. 13, 1931)	.75
Dundee, Mich. (Oct. 26)†	
	Same as Mid-Continent gravity scale
Upper and Lower Traverse sands, Mich. (Oct. 28, 1930)†	
	Same as Mid-Continent gravity scale
Cumberland, Clay, Barren, Clinton and Monroe Counties, Kentucky (Oct. 28)‡	.85
Oil City, Ky. (Apr. 1, 1931)§	.60
Oil Springs (Canada) (Oct. 28)‖	1.57
Petrolia (Canada) (Oct. 28)¶	1.50
Alberta (Canada)‖:	
50° and above (Mar. 1, 1931)	2.36
45 to 45.9° (Mar. 1, 1931)	1.87

*Posted by Pure Oil Co. †Posted by Standard of Indiana for boat shipment. ‡Posted by Paragon Development Co. §Posted by Stoll Refining Co. ¶Posted by Imperial Oil, Ltd. ‖Posted by Imperial Oil, Ltd., and Regal Oil & Refining Co. of Calgary.

MEXICAN CRUDE

Panuco*	$ .44

*F.o.b. ship, based on March transactions and exclusive of taxes and bar dues.

Of Interest to Sales Departments

50,000 GALLONS IN 2 DAYS AT STATION

LOS ANGELES, Calif., May 11.—There was a very definite weakening in Pacific Coast retail markets during the past week due primarily to competition among resellers on one hand and the new policy of meeting competition on an equal price basis by major companies. In the Hollywood district of Los Angeles, a reseller handling products of one of the large companies sold gasoline at 5 cents a gallon. This new low price, which prevailed for two days, required the aid of six policemen to keep traffic moving.

For several hours automobiles were lined up double for a distance of six blocks on Sunset Boulevard and a block each way on Cahuenga Avenue waiting to get into the station, which is of the super type, having a series of eight pumps. At one time there were 130 cars lined up by actual count.

In the two days of cut prices this station is reported to have sold 50,000 gallons of gasoline, distribution being aided by the fact that no extra service was rendered during the rush. Late in the week, quotations were increased to 7½ cents per gallon. After deducting the regular gasoline tax of 3 cents, the reseller and the refiner had 2 cents a gallon left to take care of selling expenses and refining costs. In the San Francisco Bay region, retail gasoline prices declined to as low as 7 cents at highly competitive points, although prevailing quotations for the district as a whole were substantially higher. Prices in the Pacific Northwest are also unsettled.

GASOLINE CONSUMPTION BY PLANES INCREASES

Although no estimate is available with respect to the increased consumption of gasoline by airplanes, the increase in passenger travel will serve as an indication that this mode of travel is soon to represent an appreciable outlet for refinery products. According to C. M. Young, secretary of Commerce for Aeronautics, a total of 2,715,846 passengers were carried in 1930.

Of the total, 2,298,341 were passengers in aircraft flown in miscellaneous flying operations, and the remainder, 417,505, were passengers in scheduled operations.

In the last six months of 1930, aircraft engaged in miscellaneous flying covered 56,502,560 miles. Of this total, 47,954,960 miles were credited to licensed craft engaged in miscellaneous flying The passengers carried by these operators during the July-December period totaled 1,373,541, of which 1,124,092 were carried by commercial operators for hire and 249,449 made pleasure flights.

An increase of nearly 500,000 was shown in the number of passengers carried by miscellaneous operators in the last half of 1930 over the number carried in the first six months of the year. In the period, January to June, 1930, 924,800 persons flew as passengers with miscellaneous operators.

COLLECTION LAW IN TEXAS

The new gasoline tax collection bill in Texas became effective last week when signed by Governor Sterling. The measure requires gasoline tax to be paid by refiners or wholesalers of the first distribution instead of the retailers. It is believed that the new law will largely do away with tax evasion which was estimated at 50,000,000 gallons last year. The Texas gas tax is 4 cents a gallon. Three-fourths of this income goes to the highway fund and one-fourth to the State's school fund.

TENDENCY TOWARD HIGH GASOLINE TAX RATES REDUCING CONSUMPTION

With 10 states having already passed laws providing for higher taxes on gasoline since the first of the year, last-minute efforts are being made in several additional states to increase the rates before legislatures now in session adjourn.

In Alabama it is proposed to increase the rate from 4 to 6 cents. If this increase is allowed consumers in three counties of the state will be paying 9 cents a gallon. These counties already have a county tax of 3 cents a gallon. Two other counties levy a tax of 2 cents per gallon while several towns and cities in the State have taxes of 1 or 2 cents.

It is pointed out by the Alabama Oil Men's Association in a letter to Governor Miller that an additional tax upon gasoline at this time would defeat the purpose for which it is intended by bringing about a decreased consumption of gasoline and motor oils "affording even a less revenue than is paid into the state today."

"We call your attention at this time," the letter said, "to the decreased registration of automobiles in sections where there has been an increased taxation amounting to, in the southeastern states alone over 114,000 automobiles, whereas there has been an increase in sections where there has been no increase in taxation. A decreased consumption of gallonage of gasoline and motor oils will, of course, bring about a decreased employment, a condition which the State can ill afford at this time."

In Tennessee a bill principally supported by country courts would lift the tax rate to 6 from 5 cents, while in Michigan a bill strongly supported would raise the rate from 3 to 4 cents.

Following is a list of the 10 states which have already increased their gasoline tax rates this year:

State—	New rate	Old rate	Effective date of new rate
Arizona	5	4	1-30-31
Arkansas	6	5	2-26-31
Maine	5	4	7- 3-31
Massachusetts	3	2	5- 1-31
North Carolina	6	5	4- 1-31
North Dakota	4	3	7- 1-31
Oklahoma	5	4	3-26-31
Utah	4	3½	3-24-31
Washington	5	3	4- 1-31
Wisconsin	4	2	4- 1-31

PRESSURE TANKS PROVIDE FOR QUICK SERVING OF LUBRICANTS

The Rio Grande Oil Co. of California has designed a compact system of pressure tanks known as the "Lube-Master" to be used at filling stations for the quick and convenient servicing of cars with all kinds of lubricants and greases. A picture of one of these units is shown below, as it was recently installed in a jobber's station.

In designing the equipment, A. H. Harris, lubricating engineer for the company, kept the following requirements in mind:

1. An installation that would store and apply, with the least labor, all the chassis lubricants used in volume and provide the means for removing old lubricants conveniently.
2. A unit which would be attractive in appearance and easy to keep clean.
3. Stationary equipment which would prevent changing the location of units and thus enable operators to develop higher speed in their work.
4. Unit mounting of all equipment to promote uniformity of arrangement and eliminate installation costs.
5. Provisions for hanging hose, nozzles and guns so that they are kept out of the dirt.
6. A design that would enable operators to use equipment on either side of the installation.

To fill these requirements, steel tanks are provided attached to a flat steel base which also supports a hose rack made of 2-inch pipe provided with suitable hose hooks.

The hose rack also provides a support for the crankcase drain funnel arm and the pipes which distribute air for forcing the lubricants from the tanks to the points of application, for the operation

(Continued on Page 139)

"Lube-Master" developed by the Rio Grande Oil Co.

SEEK TO PROHIBIT LEASE AND AGENCY AGREEMENTS

A bill has been introduced in the Pennsylvania legislature which seeks to prohibit the application of the lease and agency agreement in the operation of service stations. The agreements at which the bill is aimed, is of particular importance in Pennsylvania where there has been strong opposition to the lease and agency contracts. It is claimed that these agreements which are rapidly spreading in all parts of the country, work a hardship on the refiners and marketers of lubricating oils made from Pennsylvania Grade crude oil.

Several companies over a period of years have developed a nation-wide distribution of their products largely through independent dealers. Under the lease and agency agreements, the dealer generally agrees to handle only the products of the lessor to the exclusion of any of the Pennsylvania Grade oils. Pennsylvania companies are also seeking to secure a ruling in regard to the lease and agency agreements in the code of ethics which is still effective in the petroleum industry.

The purpose of the Pennsylvania bill as set forth in Section 2 of Bill No. 1,921 is as follows:

"It shall be unlawful for any concern to acquire or obtain, occupy or use any place within this commonwealth by lease or by sublease or by other contract, for a term of years or at will and to make or enter into any agreement of any nature or kind with the former owner or lessor from whom said place was so acquired or obtained, or with any other person whereby such owner, lessor or other person is made, or named or constituted as, the agent, employe or licensee of such concern for the purpose or with the intent that at, on or from said place the product or products made, produced, owned, sold or dealt in by such concern may be or is or are to be distributed or sold or offered for sale and the product or products of any competitor of such concern is or are not to be distributed or sold or offered for sale thereat, where the effect of such lease, sublease, contract, license or agreement, either separately or collectively, may tend to lessen competition or to create a monopoly."

WICHITA COMPANY ADOPTS "CASH AND CARRY" PLAN

WICHITA, Kans., May 9.—The Golden Rule Refining Co., which operates a refinery here, has adopted what company officials term a "cash and carry" policy in the sale of gasoline and kerosene to the farmer trade. The company has established a price of 7 cents on gasoline exclusive of tax and 6 cents on kerosene at its bulk stations on purchases of 40 gallons or more.

The company operates bulk stations at approximately 50 towns in Kansas and Colorado. It is said that the new method of marketing will save the farmer trade from 2 to 2½ cents a gallon in their purchases for tractor use, due to the fact that it will not be necessary to make tank wagon deliveries. Although the policy was adopted primarily to serve the farmer trade, consumers living in cities and towns can take advantage of the service if they wish to take advantage of the saving.

"We adopted the new policy to meet competition," officials of the company said. "It will aid combating the gasoline bootlegger and other objectionable practices in the marketing of gasoline."

Indiana Company Enlarges Directorate

Louis L. Stephens, General Counsel, and Dr. R. E. Wilson of Development and Patent Department Added to Board

Prepared for the first time on a consolidated basis, the balance sheet and profit and loss statement covering the operations and condition of Standard Oil Co. of Indiana and all subsidiary companies and their affiliates show total assets at the end of 1930 amounted to $801,184,070.59. For obvious reasons this figure is not comparable with the figure of $697,034,464 given as the total assets of the Standard company at the close of 1929. Subsidiary and affiliated units figuring in the consolidated report are: Pan American Petroleum & Transport Co., Midwest Refining Co., Stanolind Crude Oil Purchasing Co., Stanolind Pipe Line Co., Dixie Oil Co., and McMan Oil & Gas Co.

This change in the accounting practices of the company, according to the report, is expected to increase the value of the annual statement to stockholders as a source of accurate and comprehensive information.

"Earnings of Standard Oil Co. of Indiana, together with its share of the earnings of subsidiary companies for the year ended December 31, 1930, after deductions for Federal income and foreign taxes, depreciation, depletion, and all other reserves," the report continues, "amounted to $46,371,437.88, or $2.73 a share on the 16,996,595 shares outstanding at the end of the year. In arriving at these figures, closing inventories of petroleum products were valued at the lower of cost or market price. This procedure involved a downward adjustment of $17,026,963 and had a material effect on the showing as to earnings.

"The balance sheet shows net working capital of $216,495,360.07, including cash and marketable securities of $88,135,356.95. Total current assets were $235,834,246.12 as against current liabilities of $49,338,886.05. Dividends of $41,607,033.37 were paid by Standard Oil Co. of Indiana in 1930, or at the rate of $2.50 a share. The dividend of 50 cents paid March 16, 1931, was at the rate of $2 a share.

"Acquisition of additional stock during the year of Pan American Petroleum & Transport Co. brought the holdings of the Standard company to more than 95 per cent of all stock outstanding. Pan American's 1930 operations are reported as favorable. By exchange of stock the Standard company acquired the McMan Oil & Gas Co. which has potential production in the Mid-Continent Field of 298,000 bbls. a day. Midwest Refining Co., the report states, has developed a potential production in Hobbs Field of 132,586 bbls. a day. In January, 1931, the Standard company organized the Stanolind Oil & Gas Co. to take over the entire assets of several producing subsidiaries. This included Dixie Oil Co. At the end of 1930 producing subsidiaries held by lease or purchase approximated 171,941 acres of proven oil lands and 6,634,942 acres of promising but unexploited properties, or a total of 6,836,883 acres, as compared with 6,877,706 acres at the end of 1929. Unessential lands were eliminated. Total production by all companies for 1930 reached 63,084,200 bbls. as compared with 62,106,972 in 1929."

The company, the report continues, "has taken the position that drilling on undeveloped lands should be discontinued if a satisfactory balance of available supply of oil is to be achieved by the petroleum industry. Drilling activities have been limited to such operations as were consistent with absolute necessity. A department specializing in production matters was added to the administrative staff of the company in 1930, and has facilitated supervision and co-ordination of producing activities.

"Purchase of the Sinclair half in what is now the Stanolind Pipe Line Co. gave Standard of Indiana complete control of facilities for transporting crude oil from Mid-Continent and other fields to refineries in Missouri, Illinois and Indiana. Carrying capacity of the company's 4,400 miles of trunk lines and 2,500 miles of gathering lines is in the neighborhood of 175,000 bbls. a day. Crude oil transported by the company in 1930 totaled 40,740,693 bbls. as compared with 41,035,934 bbls. in 1929."

Pan American Petroleum & Transport Co. is operating a fleet of 34 tankers on the high seas for marine transportation of crude oil and refined products. These and chartered vessels moved 46,638,621 bbls. of crude and refined oils in 1930 as compared with 47,600,901 bbls. in 1929. Four ships and one barge on the Great Lakes carried 7,823,010 bbls. of crude oil and refined products from Muskegon and Whiting to Great Lakes ports in 1930, as compared with 8,997,987 in 1929.

The report shows that the Standard Oil Co. of Indiana group operates refineries at 13 points in the United States and 3 abroad for a total crude oil throughput capacity of 394,000 bbls. a day. Crude oil run by these plants in 1930 reached a total of 99,613,851 bbls. This is less than the 1929 figure of 100,371,261 bbls., although the 1930 statistics include for the first time runs of Pan American's refinery at Aruba, Dutch West Indies, as well as a full year's operation of that company's asphalt manufacturing plant at Hamburg, Germany.

"As part of the undertaking to reduce oversupply," the report continues, "the oil industry voluntarily adopted, in the latter part of 1930, a policy of sharp curtailment of refinery runs. This company co-operated as extensively in carrying out this policy as was compatible with assuring delivery against sales requirements. Refineries were operated at times at as little as 50 per cent of capacity. To avoid causing unemployment refinery employes were diverted to construction projects and other duties on a part time basis.

"Combined sales of the company and its subsidiaries engaged in marketing totaled 113,999,764 bbls. in 1930. In the interest of unified operation the marketing organization of Midwest Refining Co. was placed under the sales department of Standard Oil Co. of Indiana in April, 1930. This action increased the number of states in which the parent company has complete marketing facilities to 13.

"For wholesale and retail distribution of petroleum products the company group had on December 31, 1930, 4,783 bulk stations and 11,074 owned or controlled service stations in the United States. Marketing organizations abroad now own or control 14 ocean terminals, 59 interior bulk plants, and 70 service stations. Selling of automobile and truck tires and tire accessories was introduced at the service stations in 1930."

The consolidated general income account discloses that foreign, federal, state and local taxes paid by the company and subsidiaries in 1930 reached a total of $13,723,549.74. In addition to this sum the company paid gasoline tax aggregating $47,651,658.21.

Iso-Vis and Polarine oils were placed on the market in 1930. Arrangements were also made under which the company can acquire rights to use of the new process of hydrogenation in manufacture of oil products if later developments indicated advantage can be gained thereby.

Stockholders numbered 90,851 at the close of 1930, an increase of 9,210 over the preceding year. In conclusion the report states:

"The dominating influences in the history of the company in 1930 were conditions beyond its control operating powerfully throughout the petroleum industry and affecting business at large. Co-operation in following the guidance of the Federal Oil Conservation Board as to curtailment of production and manufacturing involved reducing exploration, producing and refining. . . . But it was demonstrated that reduction of output and stocks is not alone sufficient to preserve sound conditions in the industry so long as any considerable supply of crude or finished products remains without a ready market. Under pressure of the depression and of competition, many producers and refiners resorted to selling at distress prices. This practice reached sufficient proportions to affect the business of marketers generally and caused repeated adjustments of the price structure downward. Standard Oil Co. of Indiana had no part in this distress selling. Even importations of gasoline by Pan American, which have been attacked as contributing to the unsettling of the market, were upon fixed contracts and at market prices. The lower prices of 1930 resulting from defense of established business against cut price selling spelled great financial loss to the industry. Doubtful conditions have carried over into 1931. The bringing in of much new production, especially in East Texas, is a very disturbing factor, threatening to give cause to additional distress selling."

Louis L. Stephens, general counsel, and Robert E. Wilson, head of the development and patent department, were elected to the board of directors. This action brings the membership of board to 13 and follows receipt of notice that steps taken recently to reorganize the company under the modern corporation act of Indiana had been completed and the reorganization approved by state officials. While the reorganization involves no fundamental change in the company's corporate structure, the new charter allows an increase in the number of directors to a maximum of 15. Mr. Stephens joined the Standard company in 1924 as general attorney and became general counsel in 1928. Doctor Wilson joined the com-

(Continued on Page 141)

STANDARD OIL STOCKS ON NEW YORK CURB

Quotations Compiled by Francis, Bro. & Co., Associate Members of New York Curb, Kennedy Building, Tulsa, Okla.

(Complete record week ending May 2)

1931 High	1931 Low	Week ending May 2 Sales	Week ending May 2 High	Week ending May 2 Low	Close May 6	Stocks—	Outstanding capital	Par value	Div. rate	Last paid	1928 High	1928 Low	1929 High	1929 Low	1930 High	1930 Low
1	⅛	700	½	¼	..	Atlantic Lobos	499,448	N.P.	....	5-28-30	..	..	..	..	1	¼
12⅞	7⅞	No sales.	..	..	..	Borne Scrymser	$1,000,000	$25	....	10-15-30	56½	44½	46½	25	25	11¼
51	40	No sales.	..	..	..	Buckeye Pipe Line	$10,000,000	$50	$1Q	3-14-31	76	53	74½	55	69	39⅞
192½	110	500	120¼	116	..	Chesebrough Mfg.	$3,000,000	$25	$1Q‡	3-31-31	161	117	210	130	184⅞	104¼
3½	2	3,700	2⅝	2⅛	2	Creole Petroleum (sh)	5,977,873	N.P.	....	.....	17½	9½	11¾	5⅝	7⅝	3
27	20⅝	No sales.	..	..	..	Cumberland Pipe Line	$1,500,000	$50	50cQ	3-16-31	114	67	75⅜	40	65¾	20¼
31	27	50	27¾	27¾	..	Eureka Pipe Line	$5,000,000	$100	$1Q	5- 1-31	88	64¼	70½	42	54¾	26
27⅞	1⅝	No sales.	..	..	..	Galena Signal Oil	$16,000,000	$100	....	.....	13	4¼	6½	3	7	2½
72	53	6,000	55	53¼	53	Humble Oil & Refining	$74,103,300	$25	50cQ	4- 1-31	114¾	59½	128	74⅛	119	57¼
18¼	11½	10,300	13	11¾	12¾	Imperial Oil of Canada (sh)	25,421,768	N.P.	12½cQ	3- 2-31	104	56¾	41	22	30	15
21⅛	13	400	15⅛	13¼	13	Indiana Pipe Line	$3,000,000	$10	25cQ	5-15-31	91⅞	74⅜	41⅞	26	41	14½
15½	11	33,000	12⅛	11	11⅞	International Petroleum (sh)	14,247,088	N.P.	25cQ	3-16-31	55	35	30⅜	15	24	11⅜
17½	12¼	1,100	13¾	13	..	National Transit	$6,362,500	$12.50	25cQ§	4-16-31	32⅜	19⅜	25⅛	10⅛	22⅜	11½
14½	9⅛	100	9⅛	9⅛	..	New York Transit	$1,000,000	$10	25cQ	4-15-31	75	38½	17½	10	21⅜	10¼
30	28	No sales.	..	..	..	Northern Pipe Line	$2,000,000	$50	$2SA	1- 2-31	69	56½	63	41	54	26¼
15½	8	500	10	8	..	Penn Mex Fuel	$10,000,000	$25	....	12-15-30	84	28	44½	20	32	12
8	5⅜	No sales.	..	..	..	Solar Refining	$4,000,000	$25	....	12-20-29	..	..	50	29	33	4⅞
17	10	400	15½	14⅛	..	Southern Pipe Line	$1,000,000	$10	50c	3- 2-31	19	15	22½	13	20⅞	8⅜
23⅞	13⅜	4,100	15	13⅞	14	South Penn Oil	$30,000,000	$25	25cQ	3-31-31	71⅞	36¾	60¼	35⅛	45⅞	16¼
38	33	100	35	35	..	Southwest Pennsylvania Pipe Line	$1,750,000	$50	$1Q	3-16-31	102	70	70	60	64	32
38½	24⅝	88,000	28	24⅝	27	Standard Oil of Indiana	$348,175,069	$25	50cQ	3-16-31	95⅞	70⅞	63	45	59⅞	30
23⅝	17⅛	11,700	19⅜	17⅛	18½	Standard Oil of Kentucky	$25,654,516	$10	40cQ	3-31-31	179¾	122¼	46⅞	29	40½	18⅝
36½	23	900	25	23	..	Standard Oil of Nebraska	$4,649,225	$25	50cQ	3-20-31	54⅞	39⅞	50¼	40	48⅞	34⅝
62½	49	1,550	52¼	49	..	Standard Oil of Ohio	$14,000,000	$25	62½cQ	4- 1-31	134	71	129	60	108½	43¼
3½	2¾	100	2¾	2¾	..	Swan-Finch Co.	$861,466	$25	....	1-15-29	23¼	16	18	10	10	4
69¾	35	35,700	44⅞	40	35⅞	Vacuum Oil Co.	$126,180,350	$25	50cQ	3-20-31	111	72	133¾	75	97⅞	45⅜

*Ex-dividend. †Unit of trading less than 100 shares. ‡Plus 50 cents extra. §Plus 10 cents extra.

INDEPENDENT OILS ON NEW YORK CURB

Quotations Compiled by Francis, Bro. & Co., Associate Members of New York Curb, Kennedy Building, Tulsa, Okla.

(Complete record week ending May 2)

1931 High	1931 Low	Week ending May 2 Sales	Week ending May 2 High	Week ending May 2 Low	Close May 6	Stocks		Outstanding capital	Par value	Div. rate	Last paid	1928 High	1928 Low	1929 High	1929 Low	1930 High	1930 Low
1¾	⅝	8,800	⅞	¾	¾	American Maracaibo	(sh)	700,000	N.P.	....	.....	9½	3⅛	8⅝	1⅛	4½	½
16⅞	10	No sales.	..	..	..	British American Oil Corp. (new) coup.		1,311,321	N.P.	20cQ	4- 1-31	55	32¾	62	7⅞	23	13⅜
2⅜	½	4,000	1⅜	1	1¼	Carib Syndicate		$131,250	25c	....	.....	4½	3⅞	4⅞	1	2¾	⅝
20¾	13½	454,000	16	13½	15⅛	Cities Service	(sh)	24,290,359	N.P.	30cA‡	5- 1-31	90⅞	54	68⅛	20	44¼	13
84¾	79	3,100	82¼	79⅝	79¼	Cities Service pfd.	(sh)	1,500,000	N.P.	50cM	5- 1-31	103¾	94½	98¾	84	93⅞	78¼
½	⅛	4,700	⅛	⅛	⅛	Colombia Syndicate		$2,000,000	$1	....	.....	3¼	.76	2	½	¾	⅛
2¾	1½	100	1¾	1¾	..	Consolidated Royal		$5,000,000	$10	7½cQ	4-25-31	8⅞	6¼	11⅛	2½	5⅞	2
⅝	⅜	200	⅝	⅝	..	Crown Central		.....	....	....	.....	..	..	..	..	..	..
5	3⅛	400	3½	3⅛	..	Darby Petroleum		1,019,392	N.P.	....	10-15-30	33½	3¼	26	6½	21¾	4¼
6	2⅝	600	3⅛	3	..	Derby Oil & Refining	(sh)	500,000	N.P.	....	.....	2¼	1	11	2	11	2
40⅛	30	25	35	35	..	Derby Oil & Refining pfd.		48,500	N.P.	....	.....	21⅛	7½	44	20¾	60	30
75½	50⅜	9,600	54	51½	50⅝	Gulf Oil Corp.	(sh)	4,504,921	$25	37½cQ	4- 1-31	165	101⅛	209	115	166⅞	58½
⅝	⅜	5,700	⅛	⅛	⅜	Intercontinental Petroleum		$5,682,000	$5	....	.....	3⅜	1	2⅞	⅜	1¾	⅜
1⅞	⅝	No sales.	..	..	..	Kirby Petroleum	(sh)	750,000	N.P.	....	.....	3	1¼	3⅝	1¼	3	⅞
1½	½	2,700	¾	½	¾	Leonard Oil & Development		$50,000,000	$25	....	.....	9⅜	5⅛	6⅛	1	4¾	½
6¾	4½	1,300	5	4½	..	Lion Oil & Refining	(sh)	250,000	N.P.	....	10-27-30	43⅞	20	38⅞	18	29	4⅞
25	16	8,400	17	16	16	Lone Star Gas	(sh)	5,000,000	N.P.	22cQ	3-31-31	69⅛	48½	67⅞	28	55⅞	19⅝
½	⅛	3,600	⅛	⅛	⅛	Magdalena Syndicate	(sh)	850,000	$1	....	.....	1⅞	½	1¼	⅛	½	⅛
5	3	No sales.	..	..	..	Margay Oil Corp.		160,000	N.P.	....	7-10-30	48½	32	38½	14	16	3
4⅞	1½	4,100	4⅞	2	..	Mexico-Ohio Oil Co.		500,000	N.P.	....	.....	8	2¾	6⅝	2¼	7½	1¾
½	¼	No sales.	..	..	..	Mountain & Gulf		$4,000,000	$1	1cQ	4-15-31	1¾	.76	1½	¼	¾	⅜
5⅞	3¾	1,400	4	3¾	..	Mountain Producers		$1,682,182	$10	25cQ	4- 1-31	28⅞	19½	22⅞	7	12⅛	3¾
1½	1	1,900	1⅛	1	1⅛	New Bradford Oil		$1,095,291	$5	7cQ	4-15-31	5⅝	4¼	5	2½	3½	1⅛
3	1⅞	No sales.	..	..	..	New Mexico and Arizona		$1,000,000	$1	....	.....	11⅞	7⅛	9⅜	2¼	7¼	1½
3¼	1⅝	No sales.	..	..	..	North Central Texas	(sh)	400,000	N.P.	....	9- 2-30	14¼	8½	18½	6⅛	11¼	2⅛
½	¼	13,700	⅛	⅛	⅛	Pandem	(sh)	489,875	N.P.	....	.....	6	2⅛	3½	½	2½	¼
2	1⅛	No sales.	..	..	..	Pantapec Oil	(sh)	1,506,000	N.P.	....	.....	15⅝	8½	10½	1⅞	4⅜	⅞
1½	1	100	1⅛	1⅛	..	Reiter-Foster	(sh)	388,584	N.P.	....	12- 2-29	12⅞	4⅛	8½	1⅛	5⅜	1
3	2	No sales.	..	..	..	Ryan Consolidated	(sh)	500,000	N.P.	....	.....	12	4⅛	11	3	8⅝	2
1⅜	⅞	100	⅞	⅞	1	Salt Creek Consolidated	(sh)	1,286,300	$10	7cQ	4- 1-31	7¼	5½	5⅞	1⅞	2½	½
7¾	5	2,200	5¾	5	5	Salt Creek Producers	(sh)	1,496,859	$10	35cQ	5- 1-31	35	23⅛	25⅞	9	15¼	5¼
3¼	2¼	12,900	2⅝	2¼	..	Sunray Oil Corp.	(sh)	1,163,185	$5	5%Q§	4-15-31	..	..	12	5⅝	10	2
1⅞	¾	400	⅞	¾	⅞	Venezuelan Petroleum	(sh)	755,090	$5	....	2-15-30	9⅛	4¾	6½	1¾	4½	⅜
3½	1½	300	2½	2½	..	Woodley Petroleum		$500,000	$1	....	3-31-29	8¼	4⅞	9½	2	5	½
⅞	⅝	600	⅝	⅜	..	Y Oil & Gas		100,000	N.P.	....	.....	8⅜	2⅛	2⅞	½	2½	⅜

*Ex-dividend. †Unit of trading less than 100 shares. ‡Payable monthly and monthly stock dividend of one-half per cent. §Paid in lieu of regular cash dividend of 2 per cent.

TRANSACTIONS IN OIL SHARES ON NEW YORK STOCK EXCHANGE

Quotations Compiled by Francis, Bro. & Co., Members of the New York Stock Exchange and Associate Members of New York Curb, Kennedy Building, Tulsa, Okla.

(Complete record week ending May 2)

1931 High	1931 Low	Week ending May 2 Sales	Week ending May 2 High	Week ending May 2 Low	Close May 6	Stocks		Outstanding capital	Par value	Div. rate	Last paid	1928 High	1928 Low	1929 High	1929 Low	1930 High	1930 Low
23	16½	8,100	18⅛	16½	17½	Amerada Corp.	(sh)	922,075	N.P.	50cQ	4-30-31	43⅞	27⅛	42⅝	17½	31½	16½
12⅜	5	1,300	5⅞	5	..	American Republics Corp.	(sh)	209,180	N.P.	$3.50SA	12-10-30	85	51⅛	64¾	12½	37	5⅛
31	26½	30	29¼	29¼	29⅜	Associated Oil		$57,260,300	$25	50cQ	3-31-31	53⅜	37½	47¼	34½	51	30
23⅝	12½	39,800	15⅜	12½	14⅜	Atlantic Refining		$66,763,775	$25	25cQ	3-16-31	66⅜	50	77⅞	30	51⅜	16⅝
14½	8	26,800	9⅜	8	8⅛	Barnsdall Corp. A		$56,546,600	$25	25cQ	5-11-31	54	20	49⅛	20	34	8⅝
12	6⅛	81,000	7½	6⅛	7¼	Continental Oil of Delaware	(sh)	4,741,554	N.P.	....	.....	..	..	47⅞	18	30½	7⅜
47	20⅞	16,000	23⅜	20⅞	22⅞	General Asphalt	(sh)	413,333	N.P.	75cQ	3-16-31	94⅞	68	94¾	42¼	71½	22⅝
68½	35¼	36,500	43½	37¼	40⅜	Houston Oil		$24,968,600	$100	....	.....	167	79	109	26	116⅞	29¼
14⅛	8¼	25,200	9⅞	8⅜	9½	Houston Oil (new)	(sh)	908,744	$25	....	.....	..	..	..	..	11¾	6⅝
4⅝	2¼	3,500	2⅝	2¼	..	Indian Refining		$12,564,070	$10	....	.....	39⅝	9	53	13⅛	17	2
4½	2½	13,000	3⅝	2½	..	Louisiana Oil Refining	(sh)	1,190,063	N.P.	....	.....	19¾	9⅜	18	7	12	3½
3¾	1⅝	200	1¾	1¾	..	Maracaibo Oil	(sh)	330,000	N.P.	....	.....	25½	12½	18½	5¼	10⅜	1⅝
20¾	10⅝	103,200	16½	13	15½	Mexican Seaboard	(sh)	1,244,383	N.P.	....	10- 1-24	72	4⅝	59⅜	8¼	37	9¾
16¾	8	17,400	8⅞	8	8⅞	Mid-Continent Petroleum	(sh)	1,857,912	N.P.	....	2-16-31	44½	25⅛	39⅞	22⅛	32	11
19¼	8½	36,800	11¼	9¼	8½	Ohio Oil	(sh)	6,648,052	N.P.	....	3-14-31	84	58½	79⅞	64¼	32	16
35⅛	30	100	30	30	..	Pan American P. & T.		$50,084,700	$50	....	12-20-27	50⅞	38¼	69	40½	46½	42
36½	29	1,000	30	29	29	Pan American P. & T. "B"		$121,110,650	$50	....	12-20-27	59⅞	37¾	69¼	40½	67¼	30
4¼	1¾	1,000	2	1¾	..	Panhandle P. & R.	(sh)	199,370	N.P.	....	.....	21¾	11½	15¼	3	12¾	1¾
20	10	60	15¾	15	..	Panhandle P. & R. pfd.		$2,564,400	$100	....	.....	108	70	76	47½	20	47½
16⅝	7	33,500	8¼	7	7½	Phillips Petroleum	(sh)	2,593,075	N.P.	....	1- 2-31	53⅞	35¼	47	24¼	44⅜	11½
1½	⅝	1,500	¾	⅝	⅝	Pierce Oil Corp.		$29,622,831	$25	....	.....	5¼	½	3⅜	1	2½	½
3⅜	1½	7,500	2	1½	1⅝	Pierce Petroleum	(sh)	2,500,000	N.P.	10c	2-16-31	7	3½	5⅞	½	7⅛	1⅜
20⅜	9½	16,200	12	9¾	10⅛	Prairie Oil & Gas		$60,848,000	$25	50cQ	3-31-31	68	46	65⅜	40½	54	11¼
26½	17⅞	7,500	22	19	20	Prairie Pipe Line		$101,250,000	$25	75cQ	3-31-31	280	172	65	45	60	16⅝
6	2⅛	2,600	3	2⅛	..	Producers & Refiners		$37,438,950	$50	....	9-15-23	29⅞	16	25⅞	4	11⅞	1
16	7½	230	11	8	7½	Producers & Refiners pfd.		$2,845,350	$50	....	5- 4-25	49⅝	41	46¾	25½	40	11½
11⅞	5½	47,900	6⅞	5½	6	Pure Oil		$75,959,250	$25	....	9- 1-30	31⅝	19	30¾	20	27¼	7⅝
6⅜	1½	5,900	2	1½	1½	Richfield Oil		$52,410,875	N.P.	....	.....	56	23	49⅝	20	9¾	4⅛
10¼	4	17,800	4⅞	4	4⅜	Rio Grande Oil	(sh)	1,236,270	N.P.	....	7-25-30	37½	32	42½	15	25¾	5
42⅝	27½	68,500	31¼	27½	30½	Royal Dutch, N. Y.	(sh)	611,303	....	$1.3404	1-30-31	64	44⅝	64	43⅛	56½	36⅞
34	24⅜	360	24½	24⅜	..	Shell Transport & Trading Co.		£23,985,000	£1	$0.966	1-23-31	47⅞	41⅜	51½	40⅝	48⅜	26
10¼	4⅜	85,100	6	4⅜	5⅜	Shell Union Oil	(sh)	13,066,497	N.P.	....	6-30-30	39¼	23¼	31⅜	19	25½	5¼
11	5¾	2,400	6¼	5¾	..	Simms Petroleum		$8,353,620	$10	....	9-15-30	27¼	18¼	40⅛	15	37	5⅝
15⅞	8½	71,500	10	8½	8⅝	Sinclair Consolidated	(sh)	5,500,000	N.P.	25cQ	4-15-31	46¾	17⅜	45	21	32	9¾
103	95	400	97	95	95	Sinclair Consolidated pfd.		$16,025,250	$100	$2Q	5-15-31	110	102½	111	103	112¼	86
12⅞	5	4,100	5½	5	..	Skelly Oil		$27,441,250	$25	....	12-15-30	42⅝	25	40½	28	42	10⅛
51¾	33	78,200	37¾	33	37⅜	Standard of California	(sh)	12,594,098	N.P.	62½cQ	3-16-31	80	63	81⅞	51½	75	42¼
19	11	2,900	13	11	..	Standard of Kansas		$8,000,000	$25	25cQ	3-16-31	37¾	15	33¾	18	49	14⅜
52½	33½	187,900	38⅞	33½	38	Standard Oil of New Jersey		$634,999,200	$25	25cQ‡	3-16-31	59⅜	37¾	83	49	84⅞	32½
26	17⅝	96,400	20	17⅝	19½	Standard Oil of New York		$445,223,675	$25	40cQ	3-16-31	33¼	28⅜	48¼	31¾	40⅜	19⅜
45¼	34⅛	1,400	36¾	34⅛	..	Sun Oil	(sh)	1,416,869	N.P.	25cQ	3-16-31	77	31½	68⅜	55	70	39
1¾	¾	4,600	1⅛	⅞	¾	Superior Oil Corp.	(sh)	776,979	N.P.	...*	12-20-30	..	..	24	5¼	9⅜	¾
36¼	20	92,700	23¾	20	22	The Texas Corporation		$246,204,900	$25	75cQ	4- 1-31	74¾	50	71⅞	50	60½	28¼
6½	3½	2,700	4	3½	..	Texas Pacific Coal & Oil Co.		$9,304,890	$10	....	12-31-29	26⅝	12¼	23⅞	9½	14½	4
18	10½	300	13	12	..	Tide Water Oil	(sh)	2,191,759	N.P.	20cQ	3-31-31	41½	19⅝	40	14	31	13
83	66¾	400	66¾	66¾	..	Tide Water Oil pfd.	(sh)	19,947,000	N.P.	$1.25Q	5-15-31	100⅛	86	97½	85⅛	94⅞	71
9	4½	40,500	5⅜	4½	4⅜	Tide Water Associated	(sh)	5,560,424	N.P.	30cSA	2-16-31	25	14⅜	23½	10	17⅜	5⅞
68	50	2,800	53	50	50½	Tide Water Associated pfd.		$73,284,500	....	$1.50Q	4- 1-31	..	..	90⅞	74⅛	89¾	55
26⅝	14	27,900	17	14	17¾	Union Oil of California		$104,342,375	$25	50cQ	5- 9-31	58	42⅜	57	42⅛	50	10⅛
25⅛	20	4,100	21⅜	20¼	21	Union Tank Car	(sh)	1,254,048	$100	40cQ	3- 2-31	128¼	110	163¾	121⅞	38½	23
7⅜	3⅝	4,500	4⅛	3¾	3⅝	Warner-Quinlan	(sh)	632,948	N.P.	....	7- 1-30	44⅞	26	42⅞	15	27	4¼
9⅜	6⅛	1,200	7	6⅛	..	Wilcox Oil & Gas	(sh)	428,907	N.P.	....	5-10-28	..	..	29⅜	12⅞	21	6½

*Ex-dividend. †Unit of trading less than 100 shares. ‡Plus extra dividend of 25 cents.

In comparing highs and lows for the several years in the three tables, it will be necessary to take into consideration cases where there have been stock split-ups.

EASTERN MARKET IN UNSETTLED CONDITIONS

(Continued from Page 123)

fined petroleum at Atlantic and Gulf Coast ports for the week ended May 2 totaled 391,000 bbls., a daily average of 55,857 bbls., compared with 616,000 bbls., a daily average of 88,000 bbls. for the previous week and a daily average of 54,900 bbls. for the month of April. Details follow:

	Bbls. of 42 gals.
At Atlantic Coast ports—	
Baltimore	113,000
New York	206,000
Others	72,000
Total	391,000
Daily average	55,857
At Gulf Coast ports—	
All ports	None
At Atlantic and Gulf Coast ports—	
Total	391,000
Daily average	55,857

Distribution of total California oil receipts is as follows:

Gasoline	295,000
Fuel oil	96,000

Shipments of California refined products for Atlantic and Gulf Coast ports during the week (with ownership of tanker moving the oil where such owner is an oil company) follow:

To Philadelphia—114,000 bbls. of gasoline on the Northern Sun (Sun Oil Co.).

To Boston—97,000 bbls. of gasoline on the Empire Arrow (Standard Oil Co. of New York).

To Providence—72,500 bbls. of gasoline on the New York (The Texas Company).

Charter Market

Continued quiet was reported in the tanker charter market during the past week, with record low rates prevailing, and numerous vessels laid up idle. There was a little inquiry for transatlantic clean tonnage in less cargo lots for prompt loading, and some interest in full cargoes, clean, for June loading. Coastwise and interconstal markets remained quiet.

According to reports from San Francisco, several tankers are laid up at Pacific ports, with little demand for either dirty or clean tonnage. Prompt clean tonnage was reported available at 12s 6d California/U.K./Continent, with one fixture at this figure during the week, a record low price.

Fixtures reported during the week follow:

British Motorship Oil Pioneer, about 7,500 tons cargo capacity, clean oil, California/U.K., prompt, 11s 6d.

In addition, an American black oil carrier was closed for June loading, California for Japan, and another American tanker from North Atlantic (probably Philadelphia) to Brazil, two ports of discharge, clean oil, at 10s.

ROCKY MOUNTAIN AREA

(Continued from Page 47)

counties has been going on since the Greasewood discovery well came in last October, many of the leases were not recorded until recently. A. K. Carruth, Fort Morgan, Colo., has issued maps showing all leases recorded for the past three years, with the holdings of companies and individuals. One of the larger areas blocked up solid is that held by the Indian Territory company around its No. 1 State. The Texas Production Co., Phillips Petroleum Co., Transcontinental Oil Co. and Continental Oil Co. have tracts offsetting the Indian Territory company's holdings. Fifteen miles north of its test in Section 16, the Indian Territory company has another large block, but it has several holes in it as shown by the Carruth map. This block lies 2 to 5 miles west and northwest of the town of Brush. It is understood the Indian Territory company has planned to locate its first test on this block, but changed to the southern location. The Magnolia Petroleum Co. has a large block farther north in Township 5n, Ranges 56 and 57w. The Magnolia company also has considerable acreage in Township 5n, Range 59w. In addition to the companies named, the Midwest Refining Co., the Ohio Oil Co., the Empire Gas & Fuel Co., the Producers & Refiners Corp., and several other major companies are shown by the Carruth map to have considerable acreage.

Lincoln County

Eastern Colorado Oil Co.'s No. 1 State, SE cor. NW, Section 36-14-57, is now running tour and is underreaming 4¾-inch close to bottom at 3,380 feet. It expects to be making new hole within a few days and it is planned to land 4¾-inch on top of the Muddy sand expected within the next 100 to 200 feet.

Arapahoe County

MacDeb Drilling Co.'s No. 1 Fitzsimmons, NE, Section 7-4s-66, near Aurora, is having more bad luck and at a total depth of 5,805 feet again is fishing for tools. It is bottomed in sand with slight shows of oil and gas.

Adams County

Nettie M. Slatt's No. 1 Hills, SE cor., Section 27-3s-64, Watkins district, is drilling below 3,200 feet and carrying 8⅝-inch. There has been no change in the formation. At 3,200 feet it cleaned itself of drilling water. It has been showing some gas for some time. The horizon is probably the Pierre shale.

Jefferson County

Ruby Hill Oil & Gas Co.'s No. 1 Braden, SE cor., Section 24-4s-69, near Denver, is drilling at 3,905 feet in hard rock.

Park County

South Park Oil Co.'s No. 1 Milligan, NE cor. SE, Section 13-8s-76, Jefferson district, is drilling at 2,000 feet in blue shaly sandstone, identified by the drillers as the caprock over the Muddy sand.

Grand County

Oil & Mineral Lands, Inc.'s No. 1 McElroy, SE SW, Section 14-2n-81, Kremmling district, is shut down below 500 feet.

Moffat County

Mountain Fuel Supply Co.'s No. 2 State, SE NE, Tract 37-12n-100, Hiawatha district, is standing with 10¾-inch cemented on top of gas sand in the Tertiary at 2,260 feet. Total depth is 2,268 feet. It made 15,000,000 feet a day of new gas before cementing.

Rio Blanco County

The California Co.'s No. 1 California-Ragan, NW SE, Section 30-2n-102, Rangely Dome, is building rig for deep rotary test. Magnolia Petroleum Co.'s No. 1 Maddock, NW SE, Section 9-2s-96, Picenace Creek, is moving in. The test will be drilled with company tools. New rig and new casing will be used and preparations are being made for a deep test if necessary.

Montrose County

Uncompahgre Oil & Gas Co.'s No. 1, SE SW, Section 27-50n-10, near Olathe, has not been abandoned, but is standing until No. 2 is completed and may be drilled deeper.

Baca County

A. R. Jones Oil & Operating Co.'s No. 1 Boice Cattle, NW NE, Section 22-34-42, Miles Camp Dome, is being abandoned at a total depth of 4,965 feet. It had 500,000 to 750,000 feet of gas at around 2,200 feet, but nothing below that horizon. It topped an 80-foot water sand at 3,720 feet and another at 4,730-50 feet. More water was encountered at 4,775-85 feet. The sand at 3,720 feet correlated with that in which a show of oil was found in the Ramsey well to the south in Oklahoma.

Archuleta County

Standard Oil Co. of Colorado's No. 1 Fitzhugh, NW SE SW, Section 34-33n-1e, Chromo Dome, shut down at 502 feet for the winter, is preparing to resume. This well had a good show of 38 gravity oil at around 300 feet.

Larimer County

C. Leonard Smith's No. 1 State, SE cor., Section 36-12n-70, Sand Creek, which had a good show of oil and gas in the Tensleep at a total depth of 720 feet, was unsuccessful in shutting off upper water to make a test and will run and cement a string of 3-inch pipe. Standard Oil Co. of Colorado's No. 1 Wilson, NW cor. SW, Section 21-4n-69, Berthoud Dome, is resuming at 1,250 feet after shutting down for boiler repairs.

Montezuma County

Fred C. Haller's No. 2 Carr, C NE SW, Section 33-36n-14, Mount Lookout structure, is drilling at 240 feet with 70 feet of water in the hole.

UTAH

Utah County

Utah Southern Oil Co.'s No. 1 Baley, C NE NE, Section 31-23-21, Salt Valley, is drilling at 2,655 feet in salt, believed to be nearing the bottom of the salt.

MONTANA

Toole County

Two new operations in the Kevin-Sunburst Field were reported. The Majestic interests' No. 3 Davis, NE cor. SW, Section 27-35n-3w, and Diamond and others' No. 17 McCormick, NW SE NW, Section 33-35-2w, are both spudding.

Rosebud County

Prairie Oil & Gas Co.'s No. 1-X, Contract 3, NE SW NW, Section 26-10n-39, Porcupine Dome, is bottomed at 2,415 feet, where it was drilling out cement, and is having a smaller slip made to fish for tools.

Carbon County

Ohio Oil Co.'s No. 1 Montana Industrial, SE SW NE, Section 11-7s-21, Dry Creek, is drilling at 5,040 feet and nearing the top of the Dakota formation, and its No. 1 Souders, C SW SW, Section 2-7s-21, is drilling at 2,240 feet. Carbon Oil & Gas Co.'s No. 1 Armstrong, SW cor. NW, Section 7-7-22, is drilling at 1,700 feet.

WYOMING

Natrona County

Midwest Refining Co.'s No. 11 Middy, C NE NE, Section 23-35-79, test of the Midway Dome, is drilling at 6,425 feet in sandy shale after passing out of 18-foot sand in the Morrison which showed no oil or gas. It is drawing near to the top of the objective Sundance.

The Lakota Oil & Gas Co. has been organized by M. J. Kaplan and associates, of Minneapolis, to take over the All-States Oil & Gas Co. holdings on the North Casper Creek structure where four wells have been drilled. Two of the wells produce oil and two are gas wells. Plans call for the installation of a dehydrating plant and resumption of work on No. 1, NW SE, Section 1-36-82, for which rig was up last year.

Golden West Oil Co.'s No. 1 State, Section 36-36-81, Segment Basin, has resumed and is cleaning out at 1,300 feet.

Park County

Resolute Oil Co.'s No. 1, NE SW NE, Section 17-57-101, Badger Basin, is drilling ahead slowly at 8,510 feet, 15 feet in the second Frontier sand, and is making considerable oil, but has not been tested. Grebo Royalties, Inc.'s No. 1 McGrath, NE cor. SE, Section 3-47-100, is resuming after being shut down for the winter at 309 feet with 15½-inch cemented on bottom. Midwest Refining Co.'s No. 31 Rosenberg, SW cor. SE, Section 24-58-98, Frannie Dome, is being abandoned at a total depth of 4,230 feet. It was still in the red beds when drilling was suspended, the formation being tilted on edge. It evidently drilled into a fault. Same company's No. 24 Rosenberg, NE SE NE, Section 26-58-98, is moving in tools.

Big Horn County

F. T. Griffith, trustee's No. 1, SE NE SE, Section 29-56-97, Garland Dome, recently taken over from S. C. Fertig and others, is drilling at 1,800 feet. Contract calls for a 4,500-foot hole. Ohio Oil Co.'s No. 1 Smith, Lot 61, Section 33-56-97, is drilling at 1,260 feet after straightening up a crooked hole, and Utah Southern Oil Co.'s No. 3 Government, NE cor. SW, Section 29-56-97, is drilling below 3,760 feet with the Madison lime as the next objective.

Washakie County

Ohio Oil Co.'s No. 1 Strothers, SW SE NW, Section 19-45-92, Neiber Dome, is drilling at 3,220 feet and averaging better than 100 feet a day.

Fremont County

Producers & Refiners Corp.'s No. 10, SE NW SW, Section 14-32-95, Big Sand Draw, has cored to 5,163 feet and reamed to 5,153 feet. Sand at 5,119-27 feet may have been the second Morrison. Same company's No. 2, NW SE NW, Section 33-34-92, Muskrat Dome, which shut down at 4,951 feet last December, is rigging up to resume. The 10-inch is cemented at 4,900 feet.

Carbon County

Midwest Refining Co.'s No. 27 Union Pacific, NW SE SE, Section 11-20-81, Elk Mountain, which shut down for the winter at 1,810 feet with 13-inch on bottom, is preparing to resume. This is a Dakota test and will go to approximately 3,500 feet. Producers & Refiners' No. 1, Section 7-26-86, South Ferris, is drilling at 815 feet in shale.

Sweetwater County

Mountain Fuel Supply Co.'s No. 1 Cappers, SW cor. NE, Section 2-19-104, North Baxter Basin, was plugged back from 3,660 feet to shut off bottom water and will shoot sand at 3,595-3,630 feet. This sand, which is in the Sundance, is making 1,000,000 feet of gas and about 3 bbls. of very high grade oil. The Sundance is mapped as being 800 feet thick at North Baxter Basin.

Sublet County

Thomas B. Jefferson's No. 1, Section 11-28-113, Dry Piney, which several weeks ago topped a sand at 1,825 feet making considerable gas, which blew the tools up the hole where they lodged, has recovered tools and is cleaning out 300 feet off bottom to set pipe.

Lincoln County

Wyoming Produing Co.'s No. 1 Neil, NW SE NW, Section 14-24-113, Fontenelle, is bottomed at 1,555 feet and is waiting for casing to shut off cavey ground.

Uinta County

Drucilla Connell's No. 10 Union Pacific, Section 23-15-118, Spring Valley Field, is underreaming to set casing on top of sand at 1,875 feet. Sand showed considerable gas pressure. Ragan Petroleum Co.'s No. 1, Section 13-15-118, 18 miles east of Evanston, is preparing to resume. This well has been shut down at 908 feet for more than a year.

Niobrara County

Indian Petroleum Co.'s No. 1, NW NE, Section 7-35-65, Lance Creek, is drilling at 3,837 feet with the Sundance expected at 4,200 feet. Phillips Petroleum Co.'s core drill test in the SW SE, Section 32-34-65, Middle Creek, had a show of oil and gas in sand at 375 feet. The Sundance at 850 feet is the objective.

Weston County

Chadron-Osage Co.'s No. 12, CWL NE SE, Section 14-46-64, Osage Field, found the sand at 1,636-46 feet and will make a 50-bbl. well. This is an inside location among wells that have been flowing for 10 months and a drop in the gas pressure is long overdue. Clark and others' No. 1, SE NE NE, Section 15-46-64, is shut down at 1,524 feet, and Hugh Updike's No. 1, SE SW NW, Section 23-46-64, is drilling at 1,200 feet. Chadron-Osage Co.'s No. 2, NW SE, Section 31-46-63, is spudding, and Leithart and others' No. 5, NE NW SE, Section 13-36-64, is rigging up.

ARIZONA

Cochise County

Benedum-Trees interests' No. 1 Arzberger, NW cor. SE, Section 19-15s-26e, spudded on March 31 with machine in 24-inch hole and is moving in standard rig and steel derrick for test to go 5,000 feet, if necessary. The San Simion well, No. 1 Torrence, SE cor. NE, Section 27-13s-30e, is drilling at 3,965 feet in shale, with the 6¼-inch set at 3,776 feet. Century Petroleum Co.'s No. 1 Colglacier, NW cor. NE, Section 17-17-19, is shut down at 1,550 feet to finance. Ryan and others' No. 1, SE cor. NW, Section 34-14s-30e, is shut down for orders at 990 feet.

Graham County

Underwriters' Syndicate's No 1 Mark, NW cor. NE, Section 13-6s-24, is shut down at 3,765 feet to finance.

Average daily production in week ending May 9:

WYOMING	
Salt Creek	24,450
Big Muddy	1,890
Byron	5
Dallas-Derby	620
Dutton Creek	20
Elk Basin	710
Ferris	30
Frannie	890
Grass Creek	1,970
Hudson	510
LaBarge	1,010
Lance Creek	190
Lost Soldier	4,010
Lovell	....
Oregon Basin	1,380
Osage	1,130
Rock River	1,950
Poison Spider	220
Simpson Ridge	....
South Casper	380
Teapot	20
Warm Springs	....
Total Wyoming	41,385

(Continued on Next Page)

MONTANA	
Buckley-Border	760
Cat Creek	1,040
Dry Creek	580
Kevin-Sunburst	4,420
Lake Basin	50
Pondera	1,580
Total Montana	8,430
COLORADO	
Florence	370
Fort Collins	1,000
Iles	980
Moffat	880
Orchard	350
Rangely	20
Tow Creek	350
Total Colorado	3,950
NEW MEXICO	
Rattlesnake	1,001
Hogback	470
Table Mesa	77
Artesia	92
Cap Rock	...
Getty	398
Hobbs	31,500
Jal	1,151
Lea City	2,600
Eunice	495
Texas-Pacific area	150
Total New Mexico	38,534
Total Rocky Mountain fields	92,299
Total previous week	97,997
Difference	5,698

PRESSURE TANKS HELP FOR QUICK SERVING

(Continued from Page 135)

of the high-pressure lubricant gun and for the penetrating oil gun. An electrically operated gear flush is another part of a Lube-Master installation. The gear flusher is not stationary. The advantages of stationary equipment had to be sacrificed to the advantage of a short hose on the gear flusher in this instance.

The high-pressure tanks are provided with 3-inch openings, closed by flat plates held in place by six bolts so that no trouble may be experienced with air leaks or damaged gaskets. Each tank will hold 150 pounds of lubricant.

Tanks are provided for universal joint lubricant, for gear lubricant (compound), for gear oil and for high-pressure lubricant. There is also an air-operated atomizer for penetrating oils. Other lubricants necessary in the lubrication of cars are used in very small volume (except, of course, motor oils), and are dispensed from hand-operated equipment which is most convenient in this case.

To each tank there is a copper line from a balanced reducing valve at the Lube-Master air manifold. Each tank is provided also with an air inlet valve, a bleeder valve, an air pressure gauge and a safety valve. The gear oil and gear lubricant tanks are equipped with meters.

The gear oil, gear lubricant and universal joint lubricant tanks are each provided with a 12-foot hose at the end of which is a cut-off valve and a nozzle. The high-pressure lubricant tank supplies lubricant to a high-pressure booster which will deliver up to 10,000 pounds per square inch grease pressure automatically whenever required for the lubrication of spring shackle bolts, steering connections, etc.

PROGRAM TO ENCOURAGE ATTENDANCE AT MEETINGS

(Continued from Page 130)

This picture will be short. M. F. Waters, vice president of Hanlon-Waters, Inc., and chairman of the smoker, promises a full evening of entertainment.

An interesting phase of the discussion, aside from the technical problems, will be the paper by Alexander B. Morris, consulting engineer, dealing with a new phase of economics in the industry. Mr. Morris will outline a plan for exchanging gas and for the joint operation of plants in partially depleted fields with the idea of minimizing manufacturing costs. This paper will be delivered at the annual meeting, following the membership dinner Wednesday at 6:30 p.m. after which will be the election of officers and directors.

Special attention is being directed to members of the supply men's association to the meeting to be held of that group at 10 o'clock Tuesday morning at the Mayo Hotel. This will be a general business session in which the annual report for the association will be read. The chairman of the various committees will also make reports with an election of directors. There will be no election of officers as this is done at the fall meetings.

BOYD SHOWS SENATOR BORAH IN ERROR AS TO GASOLINE PRICES

By W. R. Boyd, Jr.
Executive Vice President, American Petroleum Institute

The charge is frequently made, but never substantiated by facts, that prices for petroleum products are fixed arbitrarily. Roundly one dozen investigations of such charges have been conducted by federal agencies over the past dozen years without developing any proof. The Federal Trade Commission, in the period 1916 to 1927, conducted and reported nine investigations, four in response to Senate resolutions, two by direction of the House of Representatives, two on the commission's own initiative and one at the request of the President.

Senator William E. Borah is quoted as saying in a recently issued public statement:

"In February, 1926, the price of Mid-Continent oil averaged $2.04. In February, 1929, the price was $1.20 per barrel. But the price of gasoline averaged about 18.00 cents per gallon in February, 1926, and 18.39 cents in February, 1929, notwithstanding the fact that in 1929 the refineries were recovering 44 per cent gasoline from the average barrel of crude oil, as compared with 36 per cent in 1926. The fall of the price of crude oil had no effect upon gasoline except to raise the price of it."

The American Petroleum Institute has tabulated the gasoline prices in 50 representative cities on the first of each month for the period January 1, 1919, to April 1, 1931. The tabulation covers tank wagon quotations; service station prices, exclusive of the gasoline tax; state gasoline tax averages; and service station prices, including the state tax and service station charge. The rise and fall of the posted price of 36° gravity Mid-Continent crude oil also has been tabulated.

From February 1, 1926, when crude oil was quoted at $2.04 per barrel, to February 1, 1929, when the quoted price was $1.20 per barrel, the decline amounted to 84 cents per barrel, or at the rate of 2 cents for each gallon in the 42-gallon barrel. During this same period the average station price of gasoline decreased 1.58 cents per gallon.

From February 1, 1926, when the price of crude oil was $2.04 per barrel, to January 1, 1931, when the price was 95 cents per barrel, there was a decline per barrel of $1.09, or 2.59 cents per gallon of crude oil. During this same period, the average service station price of gasoline decreased 4.48 cents per gallon.

From February 1, 1926, when the crude oil price was $2.04 per barrel, to April 1, 1931, when the price was 59 cents per barrel, there was a decline of $1.45 per barrel, or 3.45 cents per gallon. During this same period the average price paid for gasoline at service stations decreased 5.67 cents per gallon.

The average gasoline tax rate is at present almost 30 per cent of the average retail service station price of gasoline in the 50 representative cities. This represents an average tax of 3.98 cents per gallon. Perhaps Senator Borah, in computing the gasoline prices he quoted, made the natural and plausible error of including state taxes, which, rising from a fraction of a cent back in 1919 nearly to 4 cents per gallon in 1931, have tended to offset the marked decline in the retail price of gasoline. While the oil industry is placed in the unenviable position of gasoline tax collector, it cannot be held responsible for a levy that increases by 2 to 6 cents per gallon the price the public pays for an otherwise extraordinarily cheap commodity.

Comparison of Prices

The average service station price and the average gasoline tax rate per gallon are given in the following table, which shows also the decline in the price paid the oil industry for gasoline:

Date of April 1	Average service station price	Average state tax per gallon	Total paid by consumer
1919	$0.2538	$0.0006	$0.2544
1920	.2931	.0008	.2939
1921	.2755	.0016	.2771
1922	.2398	.0038	.2436
1923	.2409	.0079	.2488
1924	.2155	.0141	.2296
1925	.2140	.0203	.2343
1926	.2031	.0242	.2273
1927	.1893	.0266	.2159
1928	.1750	.0304	.2054
1929	.1744	.0336	.2080
1930	.1574	.0380	.1954
1931	.1329	.0398	.1727

A correct analysis of the price figures shows conclusively that the gasoline price has responded to the law of supply and demand and that the trend of prices, not including the state gasoline taxes, relatively has followed downward the crude oil price.

NATIONWIDE NETWORK OF GAS PIPE LINES

(Continued from Page 21)

tured gas had been replaced by natural gas in 91 communities with a population aggregating more than 1,500,000 and natural gas has been introduced for mixing with manufactured gas in districts with a total population of more than 500,000. In this connection Floyd Parsons, New York economist, who is attending the convention, said today: "We have here in the United States enormous markets for natural gas. It is wrong to assume that this gas must supplant the product now being manufactured from coal by our big utilities. It is bad to build long distance pipe lines without consumer markets having been first definitely established.

"There is no disposition among the eastern manufactured gas companies to prevent or hamper the construction of natural gas pipe lines into their industrial and domestic markets, but they do want the pipe line developments to be based on good engineering and sound economics. In fact, the manufactured gas companies are desirous of helping along the expansion of the markets for natural gas."

The main technical and research committee and various subcommittees held their meetings yesterday. It was decided that the gas measurement subcommittee, of which F. M. Towl, New York, is chairman, should proceed with further research. As a result of work already performed it was reported that the committee had arrived at accuracies within less than one-half of 1 per cent excepting on measurements at compressor stations, and that it would make investigations on this subject.

A report on pipe line flow, it was announced by the subcommittee of which H. D. Hancock, of New York, is chairman, will be ready in a few months in code book form, published by the American Gas Association. It will give formulas and methods of computing pipe line capacities.

The subcommittee on gas well deliveries, of which N. C. McGowen, of Houston, Tex., is chairman, made a report in which it was stated that the committee was developing a method of determining gas well capacities without waste of gas.

Chairman Cooper's Address

In his annual address at the opening of the convention this morning, H. C. Cooper, chairman of the Natural Gas Department, reviewed the work of the last year and touched on problems that still face the natural gas industry. Mr. Cooper is in charge of engineering operations of Standard Oil Co. gas interests centering in Pittsburgh, Pa. With the expiration of his term of office next October, much interest is manifested as to his probable successor. Ordinarily the election of the vice chairman to the chairmanship is a mere matter of routine, but H. L. Montgomery, of the Cities Service Gas Co., Bartlesville, Okla., the present vice chairman, is reported to have decided not to accept the chairmanship on account of health considerations. This will mean that both a chairman and a vice chairman will have to be chosen when the parent body, the American Gas Association, meets in Atlantic City, N. J., in October. The nominating committee has not indicated what its recommendations, which are tantamount to election, will be.

Recreation Features

Pleasant recreation fatures are sprinkled through the days of the convention. Buses yesterday noon took the gas men to the Ridgeview Country Club, where an old-fashioned southern barbecue was held. Following this there were sightseeing trips and golf at various links. Among those who brought their golf togs and clubs along were Carl J. Minnig, Phillips Petroleum Co., Bartlesville, Okla.; Dick Sophel, Dallas, Tex., Gas Co.; Hal A. Dickson, Lamar Adams, Equitable Gas Co., Pittsburgh, Pa.; Col. E. S. Dickey, manager Maryland Meter Works, Baltimore; Alex Wolfe, assistant manager; R. E. Conner, manager A.G.A. Laboratories, Cleveland, Ohio; H. E. Heil and Harry E. Bates, Peoples Gas Co., Chicago; Walter Beckjord, vice president Consolidated Gas Co. of Boston, Mass.; C. E. Bennett, president Binghamton, N. Y., Gas Co.; Floyd Parsons, New York; Ralph W. Gallagher, Cleveland, Ohio; Robert Ramsay, United Gas Improvement Co., Philadelphia, Pa.; Tom Crockett, Mississippi Power & Light Co., Jackson, Miss.; Charles Rogers, New Orleans, La., Public Service, Inc.; Dan Whitlock, Merco Nordstrom Co.; William Mallon, S. R. Dresser Manufacturing Co., Bradford, Pa., and P. A. Elfers, Fisher Governor Co., Marshalltown, Iowa.

OHIO-MEX FINDS GAS IN NORTHERN MEXICO

McALLEN, Tex., May 9.—The first proof of northern Mexico's potentialities as a producer of oil and gas came during the past week when the Ohio-Mex Oil Co.'s No. 1 Las Pilmas, located in the Mexican state of Tamaulipas, about 10 miles south of the American city of Roma, in Starr County, blew in.

The well was estimated to be making 7,000,000 feet of gas daily and was allowed to blow for several hours before being brought under control and capped.

The gasser is blowing from a depth of 1,487 feet, according to reports.

The Ohio-Mex Oil Co. is a subsidiary of the Ohio Oil Co., Findlay, Ohio.

A.A.P.G. WILL MEET IN OKLAHOMA CITY IN 1932

The American Association of Petroleum Geologists will hold its 1932 convention March 17, 18 and 19 at Oklahoma City, the executive council of the association announces. The invitation of Oklahoma City geologists made during the recent San Antonio convention was accepted at the executive council meeting in Tulsa attended by L. P. Garrett of Houston, Tex., president; Frank C. Clark of Tulsa, second vice president; Frederic H. Lahee of Dallas, Tex., third vice president, and Sidney Powers of Tulsa, past president.

A joint meeting of the American Association of Petroleum Geologists and the Geological Society of America will be held in Tulsa December 29, 30 and 31, it is announced.

CHILE MAY BUILD MEXICO LINE

Several Chilean companies, it is reported in Mexico City, will soon apply for concessions in the isthmus of Tehuantepec petroleum zone. They propose drilling wells and constructing a pipe line, using a Mexican West Coast port such as Salina Cruz from which to operate tankers to Valparaiso and Santiago.

CRACKING OF GASES ON COMMERCIAL SCALE

(Continued from Page 23)

bilizer gas cracked was substantially equivalent to propane. Mixtures of propane and butane or a gas equivalent to butanes would give yields higher than those given in Table 1, at least in ratio to their molecular weights to those of the actual gas used here. Expansion ratios would increase similarly.

Analyses of Condensates

In order to study in detail the composition and properties of the liquid hydrocarbon products of the cracking process, the low and high-stage condensates from the compression of portions of the cracked gas were collected and composite samples analyzed by fractional distillation. They were found to contain from 30 to 60 per cent of benzol, from 15 to 20 per cent of toluol, and the residue mostly higher molecular weight aromatics. The exact composition of the liquid of course varied with the cracking temperature. From 75 to 85 per cent of it met motor fuel specifications for boiling range in an Engler apparatus. In order to determine its suitability for blending with low antiknock value motor fuels, a series of blends were made from an average aromatic sample and a nonpremium commercial white gasoline in the proportions of 0 per cent, 10 per cent, 20 per cent, 30 per cent and 40 per cent respectively of the aromatic liquid (by volume). These blends were then given to an independent commercial laboratory for A.S.T.M. distillations, stream gravity-temperature distillations and for antiknock tests. The results of the tests as given in Table 2, and in Figure 3, are of unusual interest. The effect of the aromatic on the initial and endpoints, and on the rest of the A. S.T.M. curve, is small and beneficial rather than otherwise. The increase in antiknock value of the blends with the percentage aromatic in the blend is very marked, showing that the antiknock value of the aromatic condensate is materially higher than that of pure benzol. The presence of higher boiling aromatics than benzol in the condensate is shown by comparison of the blend curves with Curve "B" for standard 40 per cent benzol gasoline in the stream gravity-temperature plots.

Other similar series of blends were made and tested for antiknock and other properties. By careful operation of the cracking furnace, aromatic condensates were easily obtained which would yield less than 34 mgs. of gum forming constituents in 10 per cent blends with straightrun gasolines. The motor fuel fraction part (about 75 to 85 per cent of the condensate) was found to be equivalent to 1.5 times its volume of benzol; or to 0.12 c.c. tetraethyl lead for each per cent of it blended with an average standard grade gasoline. Its volume increases the volume of the gasoline with which it is blended in proportion to its per cent in the blend.

The above results hold strictly only for the actual samples of aromatic condensate and of gasolines taken. It is believed, however, that the values given are amply conservative from the standpoint of appraising the results which may be obtained in a commercial plant.

Fuel Requirement

As already mentioned the experimental furnace was not run to its capacity neither was it designed for fuel efficiency. Its fuel consumption was therefore not a measure of the fuel requirements of a furnace designed for efficient production. Accordingly, the heat necessary for raising the gas to cracking temperature and the heat of reaction were calculated from the actual analyses of raw and of cracked gas and their expansion ratio.

In the case of cracking for maximum ethylene production, the minimum requirement for fuel was thus found to be 9.3 per cent of the total cracked gas assuming a heating value of methane for the latter. With a cracking furnace of 60 per cent thermal efficiency, 9.3%÷.60 =15.5% of the total cracked gas would be required. In the case of cracking for maximum aromatics, the fuel requirement for 60 per cent furnace efficiency is raised to about 20 per cent of the total cracked gas.

Recycling

The yields of aromatics and of ethylene can be materially increased due to recycling of portions of the cracked gas to the furnace. In the case of cracking for maximum aromatics (see Run No. 6, Table 1), the cracked gas still contains 14.8 per cent ethylene-ethane, 1.3 per cent propylene-propane and 1.0 per cent of butenes or a total of 17.7 per cent of nonliquid hydrocarbons heavier than methane. Since the volume of the cracked gas is 2.11 times the volume of the raw gas, the 17.1 per cent of material suitable for recycling is equivalent to 361 cubic feet of recycled gas per 1,000 cubic feet of original raw gas. The additional yield of aromatics in this case due to recycling would be 361 cubic feet × 2.7 (gallons of benzol and heavier per 1,000 cubic feet of raw gas, assumed same as for raw gas in Run No. 6) = .98 gallon per 1,000 feet of raw gas. A part of the additional cracked gas formed by this recycling would again be recycled and so on, in any continuous process. The actual increased yield to be expected by recycling would of course depend upon the design and efficiency of the recovery plant used on the cracked gas.

In cracking for maximum ethylene, recycling is particularly effective in increasing the yield of ethylene, as shown in the following calculations of ethylene yields per pass through the furnace, per 1,000 cubic feet of original raw stabilizer gas. The data are taken from Run No. 4 in Table 1. The assumptions involved are those of a continuous recovery and recycling process which extracts all the ethylene and recycles at least the propylene and heavier hydrocarbons, ethane not being considered; also that the recycled material cracks similarly to the raw gas.

First pass: 100 cubic feet raw gas × 1.520 (expansion ratio) × $\frac{26.0}{100}$ (ethylene in cracked gas) = 39.5 cubic feet of ethylene from first pass.

Second pass: Of the 152 cubic feet of cracked gas from first pass, 152 × $\frac{25.3}{100}$ (per cent propylene and heavier) = 38.5 cubic feet propylene and heavier recycled to furnace.

Assuming same expansion ratio and yields of ethylene and of propylene and heavier as in first pass (this assumption should be conservative), the 38.5 cubic feet will expand to 38.5 × 1.520 = 58.4 cubic feet of cracked gas, of which 58.4 × $\frac{26.0}{100}$ = 15.2 cubic feet is ethylene and 58.4 × $\frac{25.3}{100}$ = 14.8 cubic feet is propylene and heavier.

Third pass: Calculating similarly, the 14.8 cubic feet of propylene and heavier will yield 5.85 cubic feet of ethylene and;

Fourth pass: An additional 2.25 cubic feet for the fourth pass and;

Fifth pass: An additional 0.86 cubic feet for fifth pass.

Neglecting further recycling as would actually take place in a continuous process the total amount of ethylene that can be produced from 100 cubic feet of raw gas is now totaled as follows:

	Cubic feet of ethylene
First pass	39.5
Second pass	15.2
Third pass	5.85
Fourth pass	2.25
Fifth pass	0.86
Total	63.66

Recovery of Products

The vapor pressures of benzene, toluene and heavier aromatics being very low at usual cooling water temperatures, it is possible to obtain as high as 95 per cent efficiency extraction of aromatics from cracked gases of composition similar to those given in Table 1 by straight compression to 300 pounds. Under these conditions the aromatic condensate would carry down with it considerable quantities of more volatile hydrocarbons, which could be later vented at lower pressure, and recycled. A particularly advantageous location of a plant would be near a high-pressure gas pipe line as in this case the recovery pressure could be boosted to condense more recycling stock at little or no extra cost.

The aromatic condensate can either be partially refined and used to increase the antiknock value of motor fuels; or it can be fractionated and refined into commercially pure benzol, toluol and other aromatics. Test data have already been given in this article on the composition and properties of this product.

The extraction of ethylene can be accomplished in various ways. Where the ethylene need not be separated from methane and hydrogen, it is feasible to compress the cracked gas to 400 or 500 pounds pressure and to enter it directly into a refrigerated type fractionating column, from which the ethylene and lighter (with some ethane) can be vented as overhead, while the propylene and heavier is taken off as bottoms and recycled to the cracking furnace. If the production of substantially pure ethylene is required, it is necessary to (1) scrub the cracked gas with a suitable solvent to absorb substantially all the ethylene and heavier and a small part of the methane, (2) to distill the ethylene and heavier from the enriched solvent, and (3) to recover substantially pure ethylene from the vapors of the distillation using suitable fractioning equipment.

Economical Considerations

On the basis of the experimental and other data collected in this investigation, it is estimated that a commercial gas cracking plant should be at least 500,000 cubic feet per day raw gas capacity and preferably 1,000,000 cubic feet per day to show good return on investment. The cost of a 1,000,000 cubic foot plant either for maximum aromatics production or for maximum ethylene production would run between $45,000 and $70,000 (not including recovery plant). The actual cost of tubes is a minor item in the cost of a gas cracking installation. In the case of cracking for maximum aromatics, the cost of tube repair and replacement, while proportionately higher than in the case of oil cracking processes, is not prohibitive. In the case of cracking for maximum ethylene production, this taking place at much lower temperatures, the tube repair and replacement costs are comparable to those of present oil vapor phase cracking processes.

The revenue and time for return of investment are, of course, entirely dependent upon the cost of the raw stabilizer gas and on the sales prices that can be obtained for the products made, including the stripped cracked gas. Where the raw material is a waste product, the process would naturally show up to much greater advantage; however, in studying the economics of the process, it must be considered that gas cracking converts an easily condensable gas of excessive heating value into a high methane gas similar to ordinary dry natural gas in composition, and more suitable for transportation and consumption than the raw gas. Also, under certain economic conditions, it might be advantageous to fractionate butanes away from casinghead and crack them for gas and by-products, at the same time realizing a premium price for superior butane-free natural gasoline.

It is believed that the experimental data and other findings given in this article point favorably toward the possibility of commercial cracking of stabilizer vent gas, refinery heavy vapors and similar gases for the production of maximum aromatics or for the production of maximum ethylene with a certain amount of aromatic production.

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[1]See list of references and review on Page 46, "Pyrolysis of Carbon Compounds," by Hurd, 1929, the Chemical Catalog Co., New York, N. Y.
[2]Pages 46-86, "Pyrolysis of Carbon Compounds," by Hurd (1929), Chemical Catalog Co., New York, N. Y.
[3]Stanley, J. Inst. Petr. Tech. 15, No. 76, Pages 516-552 (October, 1929).
[4]Stanley and Nash, J. Soc. Chem. Ind. 48, No. 2, Pages 1T-8T (January 11, 1929).
[5]Burrell, National Petroleum News, January 9, 1929.
[6]Cantelo, J. Physical Chem., 31, 124, 246, 417 (1927).
[7]Oeteratrom and Wagner, paper delivered at tenth annual meeting, American Petroleum Institute, Chicago, December 4, 1929.
[8]Podbielniak, The Oil and Gas Journal, Page 235, October 2, 1930.

ORISKANY SAND GAS WELLS SHOW INCREASE

(Continued from Page 47)

which furnishes gas to the Crystal City Gas Co.

Aerial Survey of Field

Preliminary surveys for the aerotopographical mapping of parts of 14 counties in central and southern New York to be used in connection with the oil and gas development have started.

The work is being done by the Aerotopograph Corp. of America, Inc., and will take approximately six months. G. W. Kneisly, engineer, who will be in charge of operations, will maintain offices in the Mark Twain Hotel in Elmira, N. Y.

The map has been contracted for by the Lycoming Natural Gas Co., the Belmont Quadrangle Drilling Corp. and several other large oil and gas concerns. After the contract has been fulfilled, the map also will be available to other concerns, Mr. Kneisly said.

The map will take in parts of the following counties: Allegany, Wyoming, Steuben, Yates, Livingston, Ontario, Schuyler, Chemung, Tioga, Tompkins, Seneca, Broome, Chenango and Cortland.

The map will cover approximately 7,000 square miles. It will be on the scale of 4 inches to the mile. It will show the roads, rivers and streams, property and line fences.

The main map will be subdivided into smaller maps, each one covering 50 square miles. Each one will be covered in minute detail. Villages and cities will be blocked off. Property will be marked off, and the owner's name marked off on the map together with the acreage.

The crew to be stationed in Elmira will consist of approximately 30 men—two aerial photographers and a ground crew. The ground crew will get the necessary property information to complete the map.

KANSAS FIELDS

(Continued from Page 36)

SE, Section 23-23-2w, is dry and abandoned at 3,556 feet.

McPherson County

Lario Oil Co. and Shell Petroleum Corp. made location for No. 2 Suffield, SW cor. SE, Section 25-19-2w, Ritz-Canon area. No. 1 Wiggers, NE cor., Section 36-19-2w, is rigging up to drill deeper from 2,975 feet. ocation has been staked for No. 2 Wiggers, NW cor. NE, Section 36-19-2w. Carter Oil Co.'s No. 1 Lagree, SE cor., Section 17-19-1w, has been completed for 27,000,000 feet of gas in chat 2,902-12 feet, total depth 2,950 feet. United Petroleum Co. and Sinclair Oil & Gas Co.'s No. 1 Loquement, NE cor. NW SE, Section 20-19-1w, gauged 23,119,000 feet of gas at 2,959 feet. Vernon Oil & Gas Co. and Shell Petroleum Corp.'s No. 1 Brum, NE cor., Section 35-19-2w, has been completed for 360 bbls. in chat 2,916-70 feet.

Marion County

Youker and others' No. 3 Riffel, NE cor. NW NW, Section 11-17-4, is spudding.

Morris County

Loomis and others' No. 1 Munsell, C SW SE, Section 15-16-7, has been completed for 1,000,000 feet of gas in sand 436-37 feet.

Rice County

Graham Brothers and Barnsdall Oil Co.'s No. 1 Turner, NW cor. SW, Section 28-20-10w, is dry and abandoned at 3,330 feet.

Sedgwick County

Magnolia Petroleum Co.'s No. 5 Wheeler, SW cor. NE NE, Section 19-27-2, is spudding.

Sumner County

J. P. Tighe moved the rig in for No. 1 Thieson, NW cor. SE SE, Section 22-34-2.

STANDARD OF INDIANA ENLARGES DIRECTORATE

(Continued from Page 136)

pany in 1922 as assistant director of research. Doctor Wilson's election gives recognition to the increasing importance of research and to the development and patent activities of the company.

The directors re-elected are Edward G. Seubert, Allan Jackson, Robert H. McElroy, Edward J. Bullock, Amos Ball, Robert E. Humphreys, Charles J. Barkdull, Gentry Cash, Melvin A. Traylor, Bruce Johnstone and A. W. Peake.

The re-elected officers are E. G. Seubert, president; Messrs. Jackson, McElroy, Bullock, Humphreys and Peake, vice presidents; Mr. Barkdull, vice president and treasurer; Felix T. Graham, secretary; Ralph E. Clarke, assistant secretary and assistant treasurer; William E. Ewald, assistant secretary, and William D. Roberts, assistant treasurer.

Lone Star Gas

Net earnings of Lone Star Gas available for the common stock after operating expenses, taxes, depreciation and preferred stock dividends were $615,186.10 in April, compared with $376,662.56 in April, 1930, an increase of $238,523.54, or 63.6 per cent.

For the first four months this year, net to common after similar deductions was $3,414,826.90, compared with $3,371,476.62 in the same period last year, an increase of $43,350.28, or 1.2 per cent.

Earnings for the first four months were ample to cover common dividend requirements for three quarters this year. The corporation is now paying 22 cents per share each quarter on the common.

Pure Oil

Pure Oil Co.'s net income for the fiscal year ended May 31, 1931, was $2,617,748, equivalent after preferred dividends to 18 cents a share on the 3,038,370 shares of common outstanding. Net income in the preceding year was $6,539,521, or $1.51 a share on common.

Inclusion of the first three months of 1931 the fiscal year accounted for 40 per cent of the $5,200,000 charged off against inventory values. President Dawes said that his company had been obliged to buy as much as 30 per cent of its crude requirements at times because of proration curtailment of own production. Extra heavy drilling expenses and capital outlays in Van Zandt Field, Texas, development were also cited. Mr. Dawes said he looks for increased earning power of the company starting in June. Operating income, 1931, $11,587,706; same, 1930, $15,728,012; other income, 1931, $914,994; same, 1930, $3,126,305. Assets 1931 were $216,551,922.

Skelly Oil

Reports of Skelly Oil Co. and subsidiaries for quarter ended March 31, 1931, shows net loss of $776,345 after taxes, interest, depreciation, depletion and inventory adjustment. This compares with net profit in first quarter of 1930 of $547,510 after taxes, interest, depreciation and depletion, equal to 50 cents a share (par $25) on 1,095,581 shares of capital stock then outstanding.

Of the net loss for the first quarter of 1931 of $776,345, approximately $600,000 resulted from writing down of inventories of crude and refined oils to the lower market prices prevailing March 31.

Vacuum Oil

Vacuum Oil Co. and domestic subsidiaries report for the year ended December 31, 1930, net earnings of $20,393,488, after depreciation of inventory and plant, amortization, depletion and federal taxes, etc., equal to $3.83 a share (par $25) on 5,325,699 average number of shares of capital stock outstanding during the year and $3.62 a share on 5,626,558 shares outstanding at the close of 1930. This compares with net profit of $35,767,627 for 1929, after inventory depreciation, reserve for federal taxes, etc., equivalent to $6.96 a share on 5,139,887 shares outstanding at the close of 1929.

In a statement issued over the signatures of C. A. Arnott, president, and Herbert Baker, chairman of the board, the company says: "Dividends received from our foreign marketing companies are included in our net profits. However, during the year 1930 the net profits of $20,393,487 include dividends which exceed by $6,084,464 the actual earnings of our foreign marketing companies, the same having been paid out of their accumulated surplus.

"We have recently acquired a controlling interest in 27 companies, thereby further strengthening and solidifying our distribution in the domestic market. The major part of this interest was acquired in the latter part of the year 1930. Our interest in these affiliated companies has been acquired largely through the issuance of stock of our company. Three of the above concerns, namely White Star Refining Co. in Michigan, Wadhams Oil Co. in Wisconsin, and Lubrite Refining Corp. of St. Louis have refineries in addition to distributing facilities which make them an outstanding factor in their respective areas.

The income account of the company for 1930, with comparison with the previous year, follows:

	1930	1929
Gross profits	*$31,833,674	$38,594,015
Inventory depreciation	5,601,422	2,126,388
Depreciation, amortization and depletion	5,262,059	.....
Taxes	576,704	†1,000,000
Net profits	20,393,487	35,767,628
Dividends	22,634,222	21,790,898
Deficit	$2,240,735	‡$13,976,730

*After deducting usual plant depreciation. †Income tax for 1929 was estimated at $1,000,000, but as excess in income tax reserve for this purpose over prior year's requirements was sufficient to take care of the tax liability, no amount was set aside from earnings for 1929. ‡Surplus.

The deficit of $2,240,735 reduced Vacuum's earned surplus from $51,794,077 to $49,553,342.

Total assets as of December 31, 1930, amounted to $240,545,974, against $205,724,910 at the close of 1929. Merchandise and materials were $48,342,114, against $53,732,006, and cash and securities $13,914,367 against $18,431,734. Accounts receivable from foreign Vacuum Oil companies at the close of 1930 stood at $21,019,993, against $16,590,976 at the close of the previous year, and real estate, plant and equipment, less depreciation, was $75,188,373, against $36,241,265. Directors declared a quarterly dividend of 50 cents, placing the stock on a $2 annual basis, against $4 previously paid.

Tide Water Associated

Tide Water Associated Oil Co. during the past six months has put into effect operating economies, which, without lowering wage schedules, have thus far effected a reduction of $3,500,000 in operating charges, said Axtell J. Byles, president, at the annual meeting here this week.

Integration of Tide Water Oil Co. has progressed satisfactorily, Mr. Byles said, and considerable crude petroleum production has been built up in the Southwest, although actual output has been held down by proration agreements. The company is producing less than 1,500 bbls. daily of its 92,000 bbls. daily potential in Hobbs and Lea Counties, New Mexico, Mr. Byles said, and its output in East Texas is likewise substantially under potential.

"Tide Water Associated Oil Co. is in better shape now to make money when the condition of the oil industry permits than I have ever known it to be," said Mr. Byles. "We are endeavoring to so conduct our affairs that we can ride out the storm no matter how long it lasts."

Shell Union Oil

Shell Union Oil Corp. and subsidiaries report for 1930 net loss of $5,095,574 after operating and general expenses, taxes, depreciation, depletion, interest, abandonments, amortization, etc., as compared with net earnings of $17,573,249 in 1929.

As a result of the sharp drop in income, the corporation's surplus was reduced $16,444,442 during the year, the surplus as of December 31, last, being $18,821,200, compared with $35,265,242 at the close of 1929.

Gross income of Shell Union and subsidiaries for 1930, after operating and general expenses and taxes, was $48,198,201, against $72,955,012 in 1929.

As of December 31, 1930, the company's reserves for depreciation aggregated $205,144,195, its 50 per cent interest in Comar Oil Co. reserves being carried at $12,304,258. A total of $46,700,223 was deducted by Shell Union last year for depletion, depreciation, drilling expenses and abandonments, as compared with $50,478,786 for these purposes in 1929, the reduction resulting from curtailment of drilling activity last year.

The consolidated balance sheet showed a reduction in current assets from $134,895,676 as of December 31, 1929, to $101,863,701 at the close of 1930, cash dropping from $8,297,668 to $6,697,960.

The unfavorable showing of Shell Union's income and profits last year has been carried over into the first quarter of 1931, a supplementary report for the three months ended March 31, last, showing net loss of $9,903,472, after depreciation, depletion, drilling expense, interest and abandonments. This compares with loss of $3,155,008 in the first quarter of 1930, making aggregate loss of $14,999,046 for the 15 months ended March 31, 1931.

Shell Pipe Line

Shell Pipe Line Corp., subsidiary of Shell Union Corp., reports for the three months ended March 31, 1930, net income of $3,797,985 after interest, depreciation, retirements, etc., but before federal tax.

This compares with a balance of $3,671,181 for the first quarter of 1930.

Surplus as of March 31, this year, was reported at $31,547,351, as compared with $18,042,756 on the same date last year.

Imperial Oil

Shareholders of Imperial Oil, Ltd., held their annual meeting at Toronto when the following officers were re-elected: President, C. O. Stillman; vice president, G. Harrison Smith, A. M. McQueen, Victor Ross; directors, C. A. Eames, C. R. Ewing, A. S. Rogers, John McNeil, Leo C. McCloskey.

Reports presented showed net profits for 1930 of $19,020,360 against $26,350,309 in 1929. Earnings from operations in Canada were $11,453,765 against $20,951,803 in 1929; and earnings from investments outside Canada were $9,105,838, or an increase over the 1929 figure of $7,593,641. Current assets amounted to $72,201,641 against $74,559,346 the previous year, and current liabilities were down from $10,128,417 in 1929 to $8,991,131 in 1930. Working capital was $63,210,510 at the end of 1930 as against $64,430,929 a year before. Cash and receivables were both higher, but inventories were more than $8,000,000 lower.

In the report of the board of directors, President C. O. Stillman pointed out aggregate disbursements in Canada for wages, material, freight and taxes of $43,632,730 added to $26,545,160.01 distributed in dividends. The volume of business had increased, but with impaired earnings, there being a decrease of about $5,000,000 in gross income from sales. The company had maintained its personnel at full strength, excepting certain reductions due to seasonal conditions.

Discussing development work in the Canadian West, Mr. Stillman said: "In the Canadian West, drilling activities were confined principally to the Turner Valley and the adjacent parts of the foothills area. The footage drilled was 56,409 feet as compared with 90,104 feet in 1929. Nineteen of the 20 wells were completed successfully, but the results in many cases were disappointing and demonstrated the wide variation in the productivity of immediately adjacent areas in that field.

"A test, in which your company has a half interest, is under way near Lethbridge, Alberta, and an exploratory well has been begun near Amherst, Nova Scotia, on a large block of leases held there.

"Total production in Alberta in 1930 has been estimated by the Dominion Bureau of Statistics at 1,368,411 bbls., of which Imperial Oil, Ltd., through its subsidiary and associated companies contributed 65 per cent, or 894,531 bbls.

"Thirteen wells were drilling as of December 31, 1930, at which time your company controlled 49 producing wells, 44 of which are in the Turner Valley. Two of the remaining five wells are at Fort Norman, and the other three are dry gas wells situated at Erickson Coulee, Deadhorse Coulee and Pouce Coupe."

Amerada Corp.

Amerada Corp. and subsidiaries report for the quarter ended March 31, 1931, net earnings of $58,225 after taxes, depreciation, depletion, lease abandonments, etc., equivalent to 6 cents per share on 992,075 shares of no-par capital stock outstanding. This compares with net loss of $76,585 in the first quarter of 1930. The board was reduced to nine members from 11. Following directors were re-elected: L. W. Baldwin, A. M. Blow, E. L. DeGolyer, J. H. Hillman, Jr., A. Jacobsen, H. W. Masters, Dean Mathey, E. B. Tracy and R. M. Youngs.

S. O. Nebraska

Standard Oil Co. of Nebraska has declared the regular quarterly dividend of 50 cents per share, payable June 20 to stockholders of record May 28.

Superior Oil

Report of Superior Oil Corp. for year ended December 31, 1930, shows net loss of $1,684,369 after interest, depreciation, depletion, abandoned leases, etc. This compares with net profit of $826,261, equal to $1.06 a share on 776,979 no-par shares of capital stock in 1929.

Atlantic Refining

At the annual meeting of the Atlantic Refining Co., John D. Gill was elected a director to fill a vacancy. At the organization meeting of the board J. W. Liberton and E. J. Henry were elected additional vice presidents.

Cosden Oil

Report of the receivers for Cosden Oil Co. and subsidiaries for year ended December 31, 1930, shows net loss of $1,147,423 after interest, depreciation, depletion, inventory adjustments, abandoned leases, etc. This compares with net income in 1929 of $1,348,255, equal after 7 per cent preferred requirements to $4.65 a share on 240,000 average no-par shares of common stock outstanding during that year and $3.72 a share on 300,000 common shares outstanding at end of year.

Ohio Oil

O. D. Donnell, president of the Ohio Oil Co., said that the oil reserves of the company are the largest in its history and the volume of its refinery sales is likewise running into record totals. The company has no funded debt, he said, but after serious consideration of the present unsettled conditions in the oil industry brought about by overproduction of crude and low prices for that product, directors decided that the interests of the company's stockholders would best be served by conservation of its resources until conditions in the petroleum industry show definite improvement.

Standard of California

Standard Oil Co. of California reports for the first quarter of 1931 net earnings of $4,368,610 after depreciation, depletion, amortization and federal taxes, equivalent to 33 cents a share on 13,102,900 shares of no-par capital stock. This compares with net of $9,430,224, or 73 cents per share, on 12,845,980 shares in the first quarter of 1930. Regular dividend No. 21, of 62½ cents a share, was declared, payable on June 15, 1931, to all stockholders of record May 16, 1931.

Marathon Increases Capital

Marathon Oil Co., subsidiary of Transcontinental Oil Co. (Ohio Oil Co.), has increased its authorized capitalization from $5,000 to $1,000,000. The company was formed in August, 1928, and only $1,000 of its authorized capital has been issued, all of which is held by Transcontinental.

Increases Imperial Holdings

Standard Oil Co. (New Jersey) has increased its holding of stock in Imperial Oil Co., Ltd., of Canada, which it controls. The New Jersey company is now credited with holding approximately 17,-

800,000 of the 25,000,000 outstanding shares of Imperial Oil.

Panhandle P. & R.

Panhandle Producing & Refining Co. and subsidiaries report for the three months ended March 31, 1931, net loss of $126,557, after taxes, depreciation, depletion, amortization, intangible development costs, etc., against net earnings of $37,225 in the first quarter last year.

Twenty Representative Stocks

The Oil and Gas Journal's weekly average price of 20 representative petroleum stocks listed on the New York Stock Exchange and New York Curb, based on closing quotations for Wednesday, was as follows:

Sept. 17	42.43	Jan. 14	27.31
Sept. 24	40.62	Jan. 21	27.55
Oct. 1	37.78	Jan. 28	27.26
Oct. 8	35.85	Feb. 4	27.26
Oct. 15	35.21	Feb. 11	28.76
Oct. 22	31.88	Feb. 18	28.53
Oct. 29	32.80	Feb. 25	29.33
Nov. 5	31.77	Mar. 4	27.67
Nov. 12	30.18	Mar. 11	26.53
Nov. 19	31.54	Mar. 18	26.78
Nov. 26	30.86	Mar. 25	26.35
Dec. 3	30.53	Apr. 1	24.80
Dec. 10	28.57	Apr. 8	25.52
Dec. 17	25.42	Apr. 15	24.72
Dec. 24	25.68	Apr. 22	22.73
Dec. 31	26.15	Apr. 29	20.54
Jan. 7	27.56	May 6	20.74

REFINERY GASOLINE MOVEMENT INCREASES

(Continued from Page 20)

tax figures for Oklahoma which show a decrease in gallonage of almost 20 per cent when compared with March of last year. In a majority of the states the gallonage is running about the same as last year.

Still another factor in the gasoline consumption is the substitution of low-priced gasoline for kerosene for tractor and other farm machinery fuel. The Standard of Indiana is said to have adopted an aggressive policy in selling its new third grade gasoline, "Stanolind Blue" to the farmer trade. This product sells at most points 2 cents under the regular Red Crown. This means a net price exclusive of the gasoline taxes of from 6 to 8 cents a gallon in most states where the gasoline used in farm work is exempted from the tax. Thus, the gasoline price to the farmer is equal to or less than the kerosene price. Cases are cited in which the delivered gasoline price to the farmer in tank wagon deliveries is 2 cents less than in the case of kerosene. This situation has proved so attractive to farmers that the gasoline is also taking the place of the tractor distillates which because of their lower prices have been substituted for the regular grades of kerosene. This relative price situation, if it continues, will mean an important gain in gasoline consumption in the agricultural states during the summer months.

Resale Business Slow

Changes in the marketing situation over the past few weeks has materially slowed up the resale movement of gasoline. In the first place the reduction in tank wagon and retail prices by the larger distributors including the introduction of a third low priced grade by several companies has reduced the jobber business, particularly that coming from operators of cut-price stations. The bulk of the resale business has come from these operators in recent months.

Another factor are the contracts offered jobbers direct, by some of the refiners. A typical contract gives the jobber one-fourth cent under the low published price on date of shipment. This is for gasoline meeting U. S. Motor specifications. With the published price 3 cents this means a price of 2¾ cents to the jobber, basis Group 3. This is as low as any resale material has been offered in Oklahoma.

Gasoline and Naphtha

Orders for U. S. Motor gasoline improved quickly last week when the price from the lowest priced sellers dropped below 3 cents. The orders usually were not large but they were numerous and by Saturday most refiners had a large number of cars moving. Business continued active the first of the week.

To satisfy a demand for low priced gasoline to meet competition in the retail end some refiners are making a gasoline which follows U. S. Motor gasoline very closely.

This accounts in part for the fact that this grade was allowed to decline under 3 cents. In the past, a majority of refiners while quoting a U. S. Motor grade were in fact selling a product which had a substantially better distillation range than is required by the government specifications. Under the new policy, certain refiners are now offering a grade with a distillation range practically the same as the minimum requirements for U. S. Motor. In some cases it is a straight cut from crude oil with a relatively low antiknock rating.

A better grade is also sold with a lower distillation range and higher gravity. The endpoint ranges from 390° to 420°. Usually the antiknock rating is higher, being a cracked product. This product is either distributed as the regular grade through the company's own stations or sold to the jobbers who want a grade which they can sell in competition with the new Red Crown, the improved grade sold at regular prices by the Standard of Indiana. In the case of the larger companies a premium of from one-eighth to one-fourth is usually obtained for the better grade.

This important shift in plant operating and sales policies may result in important changes in current quotations. With the increasing demand for high antiknock gasoline in the regular grade and as blending material for Ethyl Gasoline, most refiners will be placed in a position where they will not sell their best antiknock grades on the open market except in cases where the buyers are willing to pay premium prices. This may result in the acceptance of a separate set of prices in the tank car markets, one grade covering strictly U. S. Motor gasoline of knock rating and the other grade a product improved both in distillation range and knock performance.

Some believe that the 60-62 400 endpoint grade will shortly be accepted for the second grade, the regular U. S. Motor being termed a "competitive" grade to be sold in competition with price cutters in the retail end. It is possible that this development will have to await the adoption and acceptance of standard antiknock test now being developed by the Bureau of Standards.

The higher gravities brought little premium over U. S. Motor gasoline the past week so far as open market quotations were concerned. The 60-62 400 endpoint sold as low as 3 cents although most refiners were asking a low of 3⅛ cents. The 375 was quoted at a low of 3⅜ cents to the trade and 360 at 3½ cents.

Kerosene

The situation previously explained in regard to the substitution of low priced gasoline for kerosene is a factor in the price weakness in the latter product. The 41-43 water white grade is quoted as low as 2¼ cents in Oklahoma with 2⅜ to 2½ cents the general range of prices. The 42-44 grade is available one-eighth to one-fourth cent higher. Spot trading continues very slow.

Fuels

There is so little spot trading in the residuum grades of fuel oils, distillates and gas oils that prices are nominal. All fuels are available at least 5 cents a barrel under the quotations of a week ago. The greatest distress is in the high cold test grades. Grades above 60 cold test have been offered as low as 20 cents a barrel regardless of gravity.

The low cold test grades are in better shape and for the most part are being sold in regular channels. However, when any material is forced on the spot market distress prices are the rule. The industrial demand has not improved.

Grades of gas oil from 30 to 36 gravity which meet the usual industrial specifications are being quoted at 40 to 60 cents per barrel. Sellers are hoping that the barrel method of quoting will prove more attractive to buyers.

Good furnace oil material of low flash, straw color and gravities as high as 40 have been offered at 1½ cents to buyers. At the same time many refiners are refusing to sell at present quotations and are storing material in excess of their regular demand.

Lubricants and Wax

The predicted reduction in cylinder stocks and viscous neutral oils materialized the latter part of last week. Competition in bright stocks have not improved and the larger manufacturers reduced prices establishing a price of 14 to 15 cents for the 150-160 D grades depending on cold test. The 190-200 grade was reduced to 18 cents.

In the neutral oil list reductions centered in the higher viscosity grades. Refiners have been able to maintain substantially higher prices for these grades in the past but buyers are centering their purchases in the 200-3 grade bringing about declines in the 240 and 280 grades. The wax situation is unchanged from last week.

UPSHUR LATEST EAST TEXAS OIL COUNTY

(Continued from Page 21)

Oil Co.'s (Davis-Younger) No. 1 Minor in the Aaron Lowery Survey; Amerada Petroleum Corp.'s No. 1 C. K. Wade, in the J. H. Fields Survey, drilled during 1929; McGinley and Sigler's No. 1 J. W. Sinton, in the L. B. Brown Survey; DeArman and Burke's No. 1 Fluellan, in the Marshall Mann Survey; Penn Oil Co. and D. W. Smith's No. 1 O. B. Gage, in the J. B. B. Davenport Survey; and the Mudge Oil Co. and others' No. 1 J. D. Richardson, in the David Ferguson Survey, the county's first producer. The last named four were drilled during the present year.

Leasing

More than 80 per cent of Upshur County is now under oil and gas lease, according to assistants in the county clerk's office at Gilmer. Nearly 50 stenographers and typists are at work at the courthouse there. Deposits in Gilmer banks have increased at the rate of $250,000 a month since January 1; this has been attributed directly to oil development, for there has not been any other seasonal source of revenue in the county.

Since the first of the year Humble has checkerboarded 29 tracts in the southern part of the county, in the immediate vicinity of the Mudge-Richardson well. West of Big Sandy, The Texas Company and Sun Oil Company have checkerboarded leases up to the Upshur-Wood County boundary. In the southwestern part of the county, Magnolia has leased extensive acreage west of the Brannon and Wood block. Although Shell carries no blocks in Upshur, it has checkerboarded 12 tracts totaling 1,500 acres in the southeastern portion.

Blocks

Ten large blocks are in effect throughout the county, four of which are held by the following majors: Amerada, Gulf, Humble and Southern Crude.

Portions of blocks of adjoining counties extending into Upshur include: 1,000 acres of the 5,000-acre drilling block of H. C. Duke and others extending from Camp County; a portion of the Gulf block extending from Gregg and Harrison Counties; and a few tracts of the 3,000-acre block of the Gulf extending from Wood County, towards Big Sandy.

The following blocks are in effect (index letter refers to the block outlined on the accompanying map): (A) Humble Oil & Refining Co.; (B) William McGinley and Lloyd Sigler, 7,000 acres; (C) J. K. Wadley; (D) Southern Crude Oil Purchasing Co., 17,000 acres; (E) Amerada Petroleum Corp., 15,000 acres; (F) Gulf Production Co.; (G) Brannon and Woods, 3,000 acres; (H) E. R. Perkins, 2,000 acres; and (I) Penn Oil Co. and D. W. Smith.

The Amerada block was taken during July, 1928; the Southern Crude block in December, 1929; the Penn Oil, the Perkins, the McGinley-Sigler and the Wadley blocks having been taken during January of the present year. There are no drilling contracts on record concerning the Gulf, Southern Crude or Wadley blocks.

Regional Geology

Upshur County is located on the northwest flank of the Sabine uplift. All of the county except the southeastern portion lies in the northern part of the East Texas geosyncline. The salt basin (interior) lies to the west and southwest of the county; no salt domes have been discovered within the county's limits.

The normal sequence of formations penetrated by the drill in Upshur County wells is as follows:

Series—	Formation	Member
Tertiary—		
Eocene (lower):	Mt. Selman	
	Wilcox sds.	
	Midway	
Cretaceous—		
Gulfian:	Navarro	Nacatosh sd.
	Taylor	Upper Taylor
		Pecan Gap chalk
		Blossom sd.
	Austin chk.	
	Eagleford	
	chalk	
	Woodbine sd.	
Comanchean:	Woodbine sd.	
	Del Rio clay	
	Georgetown lime	

Surface Geology

A portion of the Mount Selman formation, the Queen City and the overlying Weches, members of the lower Claiborne group, outcrop throughout the county from west to east. The most pronounced surface geologic feature is the Kelsey structure situated in the northwestern portion. During 1929, Amerada drilled a test well on this surface expression, the attempt proving a failure although drilling was carried into the lower Comanchean. This test was abandoned at 6,153 feet. No shows of oil or

UPSHUR COUNTY—INDIVIDUAL WELL RECORDS

Index	Operator	Farm	Survey	Drilling dates Commenced	Drilling dates Completed	Total depth	Status	Elev.	Shows	Finished drilling in
1	Arcadia Ref. Co.	P. S. Johnson	Jas. S. Mallory				Rig			
2	McGinley & Sigler	J. W. Sinton	L. B. Brown	Feb. 1931	Mar. 1931	4,004	Dry	359	None	Woodbine
3	Richardson & Chote	S. G. Newsome	A. Butler	1928	1928	2,025	Dry	329	s.o. 1,901-13 s.o. 1,972-79	Navarro
4	Davis-Younger Oil Co.	Bell	Aaron Lowery			2,316	Dry	343		
5	Utex Oil Co.	Minor	Aaron Lowery			3,565	Dry	345	s.o. 1,830-1,985 s.o. 2,000-25 s.o.&g. 3,520-65	Woodbine
6	Amerada Pet. Corp.	C. K. Wade	J. H. Fields	Mar. 1929	Sept. 1929	6,153	Dry	405	None	Comanchean
7	Rowland Oil Co.	Mitchell	Sarah Powell	May 1923	1923	3,808	Dry	365	s.o. 1,168-88 s.o. 2,154, 2,820	Lower Taylor
8	R. L. Wilburn	Hudspeth	Aaron Jackson	June 1929		4,114	Dry	382	s.g. 3,156-68	Georgetown
9	Magnolia Pet. Co.	G. L. Connor	M. H. Polvador	Apr. 1927	June 1927	2,610	Dry	422		Nacatoch
10	Nichols & Concannon	G. L. Connor	M. H. Polvador	Dec. 1924	Apr. 1925	3,519	Dry	422	s.o. 2,507-24	Austin
11	W. J. Green	J. W. Woodin	Isham Williams				Rig			
12	Brannon & Woods	W. D. Robertson	C. I. Stephenson	Apr. 1931		3,360	Drlg.			
13	Beeler et al	R. H. McClelland	M. P. Torres				Rig			
14	Gilmer Oil & Dev. Co.	Lowery	Wm. McClung			1,250	Dry			
15	Perkins, McPhail et al	Kay	Thos. J. Elliott	Apr. 1931		200	Drlg.	298		
16	Penn Oil-D. W. Smith	O. B. Gage	J.B.B.Davenport	Mar. 1931	Apr. 1931	4,095	S.D.	377		Georgetown
17	C. L. Starkey	C. A. Lee	Wilson L. Farmer				Loc.			
18	Mudge Oil Co. et al	J. D. Richardson	David Ferguson	Apr. 1931	Apr. 1931	3,745	Oiler	462		Woodbine
19	McCullough et al	John Copeland	Marshall Mann				Loc.			
20	DeArman & Burke	Fluellan	Marshall Mann	Feb. 1931	Apr. 1931	3,864	Dry	428	s.o. 3,777-81	Woodbine

gas were encountered. Not satisfied with this test, Amerada will soon drill another well on this structure, 3 miles south of their old failure.

UPSHUR COUNTY, TEXAS
Present Status of Development

Summary

Locations	2
Rigs up	3
Drilling	2
Shut down	1
Oil wells	1
Gas wells	0
Dry holes	11
Total for the county	26

EXPECTING DECISION ON VACUUM MERGER

By A. E. Mockler
New York Bureau, The Oil and Gas Journal

NEW YORK, May 11.—An early decision is looked for by the United States Government in the matter of an appeal from the decision of the Federal District Court in St. Louis, sanctioning a consolidation of the Vacuum Oil Co. and the Standard Oil Co. of New York, according to reports here. Following the failure of the Department of Justice to secure a court ruling barring the merger, the Government was given until June 4 to take further action, and is expected to carry the case before the United States Supreme Court for final adjudication.

If the Government fails to appeal the case, there is considerable uncertainty here as to whether the consolidation will go forward on the terms originally announced. Since the consolidation was first formally broached, the unsettled stock market has resulted in a serious derangement of the original ratio of exchange, which provided for the exchange of three shares of Standard of New York stock for each share of Vacuum stock. At the time the deal was first announced, Standard of New York was selling at approximately $30 per share, with Vacuum at $90, and the exchange terms were equitable. The present selling price of the securities of the two companies shows a pronounced advantage to Vacuum holders in the event that the original terms are adhered to. Socony is currently selling around 19, with Vacuum under 35. On this basis, an exchange of two shares of Standard of New York for one of Vacuum would be more in line with actual market conditions.

While it has been reported in some quarters that the Government might not appeal the decision of the St. Louis Federal Court, it is generally believed that the Department of Justice will prosecute the suit to the Supreme Court to establish a precedent. Since the proposed consolidation of Socony and Vacuum was first announced, there have been reports linking several of the old Standard units in proposed mergers, and it is thought that the Government will carry the Socony-Vacuum case to the final court rather than be compelled to institute separate actions to cover each of the several prospective further consolidations of old Standard units.

Standard Oil Co. (New Jersey) and Standard Oil Co. of California are known to have carried on informal discussions looking to the possibility of a closer community of interests, and several of the other former Standard units have also been mentioned as considering regroupings to effect economies in operations.

SHELL GETS LARGE CONTRACT

WASHINGTON, D. C., May 12.—The Shell Oil Co. has been awarded a contract for supplying 4,620,000 bbls. of fuel oil for the Navy at a price of $2,260,100 for the battle fleet at San Pedro, Calif. The oil under the law is to be from American wells. This includes most of the Navy's requirements for the next fiscal year.

Contracts for 216,000 bbls. at $204,620 were awarded the Union Oil Co. of California and 160,000 bbls. at $95,250 to the Associated Oil Co. The oil is Grade B fuel oil for delivery on the West Coast.

Contracts for Diesel oil were awarded the Union Oil Co., 158,750 bbls., at $143,000, and the General Petroleum Co., 250 bbls. at $357.

UNION SULPHUR DRILLS 9,250 FEET IN SALT DOME TEST IN LOUISIANA

By Nell Williams

HOUSTON, Tex., May 9.—To Union Sulphur Co.'s No. 762 Fee, located at Sulphur Dome, Calcasieu Parish, Louisiana, goes the distinction of being the deepest hole ever drilled east of the Rocky Mountains. This test recently went to a total depth of 9,250 feet, where drilling was abandoned, and the hole plugged back to a sand higher up.

This test also set another record of particular interest to Gulf Coast operators, in that it drilled into more salt than any other test on the coast. Salt was topped at 5,864 feet, and still being in salt at 9,250 feet, this test went 3,386 feet into the plug. The greatest amount of salt previously drilled into was The Texas Company's No. 17 Wheeler & Pickens at Humble which went 3,070 feet into the plug.

The depth of this test is exceeded only by a very few tests in California, where production has been found below 9,250 feet. While it is only a few hundred feet deeper than several other tests which have been drilled east of the Rockies, it is typical of the modern trend to deeper exploration. Deep producers in the Big Lake Field, Reagan County, West Texas, previously have held the depth record, not considering the California wells. One of those wells, Big Lake Oil Co.'s No. 3-C University, was drilled to a total depth of 8,923 feet.

The record of the Big Lake well did not exceed by far the depth reached by Yount Lee Oil Co.'s No. 9 Housierre-Latrielle, southeast side of the Jennings Dome, which was abandoned last March at 8,900 feet even, the latter well, prior to the drilling of Union Sulphur Co.'s No. 762 Fee at Sulphur, being the deepest hole on the Gulf Coast.

No Special Equipment

One feature in connection with the Sulphur test was that it was drilled without any special equipment. The test originally was started to go only to around 5,500 feet, which depth would cover all the present producing sands of the field. Thus all the equipment was the same as that used on other such tests there. The derrick is the standard 122-foot steel construction prevailing on the newer operations. Occasionally a leg or two had to be blocked up a little bit to prevent sagging in the soft ground but otherwise no special provisions were made. Two 85 horsepower boilers generated the steam and drawworks, rotary, crownblock, pumps, cable, etc., were all standard equipment of the various manufacturers.

The test originally was completed last October in a sand at 4,777-89 feet flowing approximately 800 bbls. daily, and when the well stopped flowing around the first of the year the operators started deepening the hole to a lower known sand. However, on topping the salt at 5,864 feet it was decided to try to drill through salt in an effort to prove the existence of an "overhang" and possible subsalt sands, such as has been found at Barbers Hill and Allen Dome. Although the test did not succeed in drilling through salt, it gave additional proof that it is not impossible to drill great depths into salt if necessary in exploration of possible very deeply underlying sands.

Before the salt overhang was proved around the Barbers Hill Dome and producing sands were found underlying, it generally was thought that it would be impossible to drill great distances into the salt with a view to drilling through it due to crystallization of drill stem and other such obstacles. Around the edges of the Barbers Hill Dome, some wells have had to drill through as much as 1,850 feet of salt before going back into formation again and finding pay sands. No wells anywhere have gone through a greater amount than that and back into formation again but the closer up on the dome the greater the amount of salt which must be penetrated. Whether it is possible to drill through the main salt core remains to be seen but such tests as Union Sulphur Co.'s No. 762 Fee may lead the way for further exploration.

Superintendents and crew in charge of drilling Union Sulphur Co.'s No. 762 fee, Sulphur Dome, Calcasieu Parish, Louisiana, deepest test east of the Rocky Mountains. Left to right are: W. M. Petty, driller; John Richardson, general superintendent of production; Drew Collins, field superintendent; Donnie Ellender, Bud Carlisle and Willie Pickard, helpers.

Drilling Very Rapid

Due to the soluble nature of the salt, drilling was very rapid and the 3,386 feet of salt was made in less than a month, the top of the salt being reached about April 3 and the bottom May 1. While salt facilitated this test in setting new depth records as contrasted with the harder drilling in formation as in other deep tests, yet the possibilities of crystallization, breaking of drill stem and cavities due to the salt washing out created hazards which made drilling as difficult as if it had been done in formation.

The drilling was done with 3½-inch Republic Steel Products Co. drill pipe which oddly was made up of two different weights including 13¼-pound material and 8½-pound material. The difference in weights was due to the use of whatever drill pipe which could be collected around the field. Efforts first were made to keep the different weight pipe separated but toward the last the different pipe was run in indiscriminately as it was handy to do so.

The possibility of a break in the pipe as a result of its length and weight and possible loss of most of it in the hole was one of the chief factors in deciding operators against drilling further into the salt. From the depth of 9,250 feet, however, every foot of pipe was recovered without trouble.

Drilling of the test was through open hole from 5,854 feet on down. At that depth, just 10 feet above the salt a string of 6⅝-inch casing was run. Other casing in the hole included 4,770 feet of 9⅝-inch pipe and 1,320 feet of 12½-inch pipe.

Union Sulphur Co. recently made another attempt to drill through salt, that being in its No. 764 Fee which was abandoned in salt at 6,473 feet. It topped salt at 4,453 feet, making a total of 2,020 feet of salt drilled.

Operations at Sulphur are in charge of John Richardson, general superintendent of production, with Drew Collins, field superintendent. W. M. Petty was driller on the No. 762 Fee, with Donnie Ellender, Bud Carlisle and Willie Pickard, helpers.

Sulphur Dome, originally developed only for sulphur and which has been one of the richest sulphur mines in the world, although at present nearly exhausted for this product after more than 20 years of operation, has been developed for oil during the last several years and has proved one of southern Louisiana's most important oil fields. Production so far has been confined to the west flank. It is owned entirely by the Union Sulphur Co.

REFINERY PRICES IN GULF COAST DECLINE

HOUSTON, Tex., May 11.—Additional weakening of Gulf Coast refinery markets was indicated the past week with pale and red oils taking the brunt of price reductions. A general cut in lubricating stocks was reflected. Spot gasoline also was quoted from a quarter to a half cent lower but bulk and contract material showed no actual change.

Fuel oils continued weak, although there were no additional price slipping. Bunkers were posted at 80 cents two weeks ago and so far as known there has been no effort to undersell the posted price to any extent. Bulk fuels were available readily from 60 to 62½ cents but there was very little demand at that figure.

Spot gasoline was quoted generally at 4¾ cents but what little material is moved out of coastal refineries evidently is being bought at lower prices as certain buyers have purchased small lots after being quoted 4¾ cents from others. Contract gasoline based on North Texas prices was available out of refineries here at 4⅜ cents. Bulk gasoline was quoted from 4¼ to 4½ cents. There was no change in gas oils.

SAFETY DRILLING RULES FOR EAST TEXAS FIELDS

AUSTIN, Tex., May 12.—The railroad commission has put into effect, subject to hearing May 22, safety drilling rules applying to Upshur, Gregg, Rusk and Smith Counties.

Casinghead gas must be piped to a safe distance from tank batteries, wells and buildings, and burned, except where it can be utilized in accordance with law and other rules. The use of casinghead gas for fuel and other purposes aside from gas lift is encouraged where safe. Where gas is burned the rules require "risers" to keep the fire at a safe distance above the ground.

Another rule requires cementing of casings by the pump and plug method. Another requires installation of a blowout preventer on each well after the producing string of casing has been set and cemented.

Another rule says: "Drilling of the pay formation must be done slowly and carefully, and operators are hereby ordered to refrain from drilling the maximum amount of pay."

PRODUCTION IN MEXICO

March petroleum production in Mexico totaled 2,815,719 bbls., a daily average of 90,829 bbls. Revised official figures place oil output in February at 2,563,986 bbls., a daily average of 91,571 bbls. The question of foreign imports of gasoline in all its ramifications is being studied by the Department of Ministry, Industry, Commerce and Labor.

CODE SPECIFICATIONS PROPOSED FOR SHIELD WELDED PRESSURE VESSELS

By G. Raymond
Vice President, American Tank & Equipment Corp.

Of much importance to the petroleum industry are the recent remarkable improvements in the art of electric arc welding known collectively as shielded welding processes. By means of these greatly advanced welding processes, joints of nearly 100 per cent efficiency can be rapidly formed between parts of almost any thickness or shape. They are making economical the welding of formed plates into pressure vessels which, in behavior, compare well with vessels forged from single ingots. Their safety is most forcibly attested by the recent action of the boiler code committee of the American Society of Mechanical Engineers. This properly conservative body now proposes for the first time specifications under which fusion welding may be used for pressure vessels without limit as to size, thickness or use.

That it is now possible to overcome brittleness, the boiler code committee recognizes in the December, 1930, issue of Mechanical Engineering, the monthly journal published by the American Society of Mechanical Engineers, where appears "Proposed Specifications for Fusion Welding of Unfired Pressure Vessels." From this specification two significant sentences are quoted:

"All joints in vessels covered by this code and of any dimensions may be fusion welded provided that in addition to meeting the requirements for material and design they will conform to the following specifications, based on those which have been published under the heading, 'Proposed Specification for Fusion Welding of Drums or Shells of Power Boilers'."

"The committee is also considering the classification of pressure vessels and should a classification be adopted, these specifications are primarily intended to cover the class of vessels demanding the highest type of construction."

Proposed Specifications

In the March, 1931, issue of the same journal is published an article entitled "Proposed Specifications for Fusion Welding." From this specification the following interesting paragraphs are extracted:

"The following proposed revisions, which are now under the joint consideration of the American Welding Society and the boiler code committee, are for embodiment in the code for unfired pressure vessels and for embodiment in the code for power boilers."

"Pressure vessels may be fabricated by means of fusion welding provided the construction is in accordance with the requirements for material and design as required by this code and the fusion welding process used conforms to the specifications for the grade of welding indicated for each class of vessel."

"Fusion-welded pressure vessels shall be classified according to the following schedule. The grade of welding required for each class shall be as indicated.

"Class 1. All vessels covered by this code, constructed in accordance with the rules of this class, may be used for any purpose. This class includes vessels containing noxious, poisonous, or inflammable liquids or gases. These vessels shall be welded with Grade 'A' welding. The allowable working stress shall be 18 per cent (one-fifth of 90 per cent) of the minimum of the specified tensile range of the plate used.

"Class 2. All vessels covered by this code are included in this class, excepting those containing noxious or poisonous gases or liquids, provided the plate thickness does not exceed 1¼ inches. These vessels may be welded with either Grade 'B' or Grade 'C' welding. When Grade 'B' welding is used the allowable stress shall be 16 per cent (one-fifth of 80 per cent) of the minimum of the specified tensile range of the plate used.

"Class 3. All vessels covered by this code not exceeding three-eighths-inch plate thickness and used for storage of gases or liquids at temperatures not exceeding their boiling temperatures at atmospheric pressure, may be included in this class, except those containing noxious, poisonous, or inflammable liquids or gases. These vessels may be welded with Grade 'D' welding. The allowable working stress shall be 12 per cent (one-fifth of 60 per cent) of the minimum of the specified tensile range of the plate used for butt joints, and 10 per cent (one-fifth of 50 per cent) for double-fillet-welded lap joints.

"The allowable working stresses on the joints in pounds per square inch for different temperatures are given in Table 1."

Thoroughgoing Tests

Please note that no restriction as to size, thickness or use is placed upon fusion welded vessels when constructed according to Class 1 of these specifications. From Class 2 construction are restricted only those vessels greater than 1¼ inches in thickness or those containing noxious or poisonous liquids or gases.

These specifications go on to cover in detail a thoroughgoing set of tests intended to show forth completely the results of the welding work. They include tensile tests and bend tests of the welded joint, tensile and specific gravity tests of the weld metal, hydrostatic and X-ray tests of the completed vessel. Stress relieving, qualification of welders, qualification of process, and of course quality of plate material are also covered. Full discussion of these proposed specifications have been invited of all interested. The particular co-operation of the oil industry has been solicited by visits from C. W. Obert, honorary secretary of the boiler code committee, to the Mid-Continent and other oil fields.

It is not the purpose of this article to enter into a discussion of the details of these specifications, except to point out that their working stress allowances are considerably more conservative than those now generally used in many branches of the oil industry. These specifications are mentioned here because they are most convincing proof of the advances which have been accomplished in the welding art.

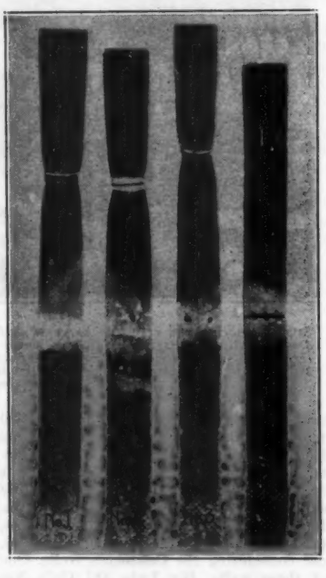
No restriction is made in them as to the type or kind of welding technique which shall be employed. The term fusion welding which they use throughout will apply to any kind of acetylene or electric arc welding. However, their requirements as to ductility, strength and homogeneity of the deposited weld metal are so exacting, particularly in the first and second classes in which most petroleum equipment will fall, that it is safe to say they can at present be satisfied by the new shielded arc welding processes or by the acetylene welding process. By far the larger part of the development work which has led up to these specifications has been accomplished by these shielded arc welding processes which represent one of the highest developments to date in the rapidly changing art of fastening metal parts together.

Essential Requirement

The details of these shielded arc welding processes are for the most part the carefully guarded secrets of the companies which have developed them. However, they all possess one common characteristic which is the keynote of their success:

The welding must be accomplished in a neutral or reducing atmosphere rather than in an oxidizing atmosphere.

Although it is easy to state the requirement that the weld must be completed in a neutral or rducing atmosphere, it has been very difficult to accomplish this. Years of painstaking research have been required to reduce the various methods to commercial success. It can be fairly stated that exacting control and regulation of all factors in the process—extremely careful technique—are prerequisite to success. The temperature of the arc at which the weld takes place is extremely high. The ever-present oxygen and nitrogen of the atmosphere are all too eager to work in and attack the iron at these extreme temperatures. It is no simple matter to keep them entirely out. Any reducing agent used is likely to become contaminated by the surrounding air. It is also likely to be dissolved into the steel, later to form blowholes and porosity. Fluxes used are likely to become entrapped in the weld metal. There are other difficulties too numerous to mention.



Tensile tests of welds through which holes have been drilled demonstrate excess strength of joint.

However, the rewards to be attained, once all conditions are properly controlled are most gratifying. The weld metal can be made stronger than the parts joined. This is illustrated by the accompanying photograph. Here holes have been drilled in the welded joint occurring at the center of tensile test specimens after all excess weld metal has been machined off. These holes progressively weaken the weld until it breaks in the fourth test with three holes. The results of these tensile tests as set forth in Table No. 1 indicate that the strength of the weld metal was 77,000 pounds per square inch whereas the strength of the base plate averaged 55,233 pounds per square inch.

Excess Strength

This excess strength of the weld metal is attained without sacrificing ductility. These bend tests form one of the most sure and simple means of proving the character of the welds during the process of development. If fusion is not complete there will be failure along the side of the weld at an early stage in the bending. If there is slag or other inclusion in the weld the bend test will show it up all too readily. If the metal is inclined to be brittle, or to be porous, the bend will fail before the required elongation is secured and the resultant fracture will disclose the feature of the defect. The boiler code specifications propose an elongation of 30 per cent within the weld metal under free bend tests for their highest quality welding (Grade "A"). Elongations of 40 to 50 per cent are readily attained.

The conditions in the welds of complete vessels may be somewhat different from those depicted by individual test specimens due to the temperature stresses set up by the welding operations, the heat of which is much greater under shield welding conditions. So although the tough ductile weld metal of the shield welded seam is incomparably able to withstand these stresses, it is considered desirable in the case of most vessels, and imperative in the case of those whose walls are thick in proportion to their diameters, to relieve these temperature stresses by a low temperature annealing operation. In this operation the entire vessel is heated in a large annealing oven to a uniform temperature of 1,100° F., a dull red heat just safely below the sagging point for thin walled vessels, and allowed to cool slowly in still air.

Careful Preparation

The proper careful preparation of the parts before welding is a prerequisite to the successful manufacture of these high quality pressure vessels. The importance of this preparation can not be overlooked. The quality of the steel plate and other raw materials must be carefully controlled. The design must be correctly proportioned in all its details to guard against local concentrations of stresses. All edges for welding must be accurately machined so that they will fit straight and true upon assembly. The rolling and forming must be so carefully done that all parts will fit properly together without undue straining. In the routine of welding "cleanliness is next to godliness" toward securing perfect welds.

These processes have now been developed to the point that vessels so uniform in strength are being regularly built that for demonstration purposes they can be stressed far beyond their elastic limit to the ultimate strength of the plate material. Whereupon, after due stretching, they are far more likely to fail in the plate than in the tough welds.

RUMANIAN OUTPUT GAINS

NEW YORK, May 9.—Notwithstanding record low prices for Rumanian refined petroleum products, and growing difficulties due to overproduction in domestic markets, Rumanian producers substantially increased their production during the first quarter of 1931.

Production totals of the major Rumanian operators for the first three months this year, with comparisons with 1930 production figures follow:

	—Metric tons— First quarter	
	1931	1930
Steaua Romana	254,750	199,945
Astra Romana	262,039	275,870
Concordia	240,150	33,684
Creditul Minier	186,037	172,697
Phoenix Group	175,617	140,986
Romana-Americana	120,340	90,602

TABLE NO. 1—TENSILE TESTS OF WELDS MACHINED FLUSH. WELDS WEAKENED BY DRILLED HOLES TO DEMONSTRATE EXCESS STRENGTH OF JOINT.

Sample No.—	Width	Thickness	Holes	Ult. strength (lbs.sq.in.)	Stress in weld metal	Remarks	Elongation in weld metal	Reduction area in weld metal
1	1.645	.490	None	57,200	57,200	in plate	..	..
2	1.784	.495	1-3/16x.495	55,500	62,200	in plate	25%	..
3	1.650	.497	2-5/32x.497	53,000	65,150	in plate	24%	..
4	1.540	.495	3-5/32x.495	.....	77,000	in weld	48%	22%

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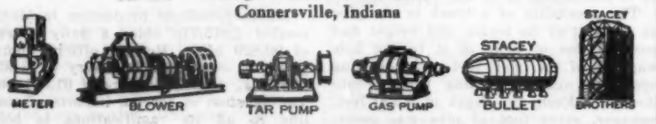

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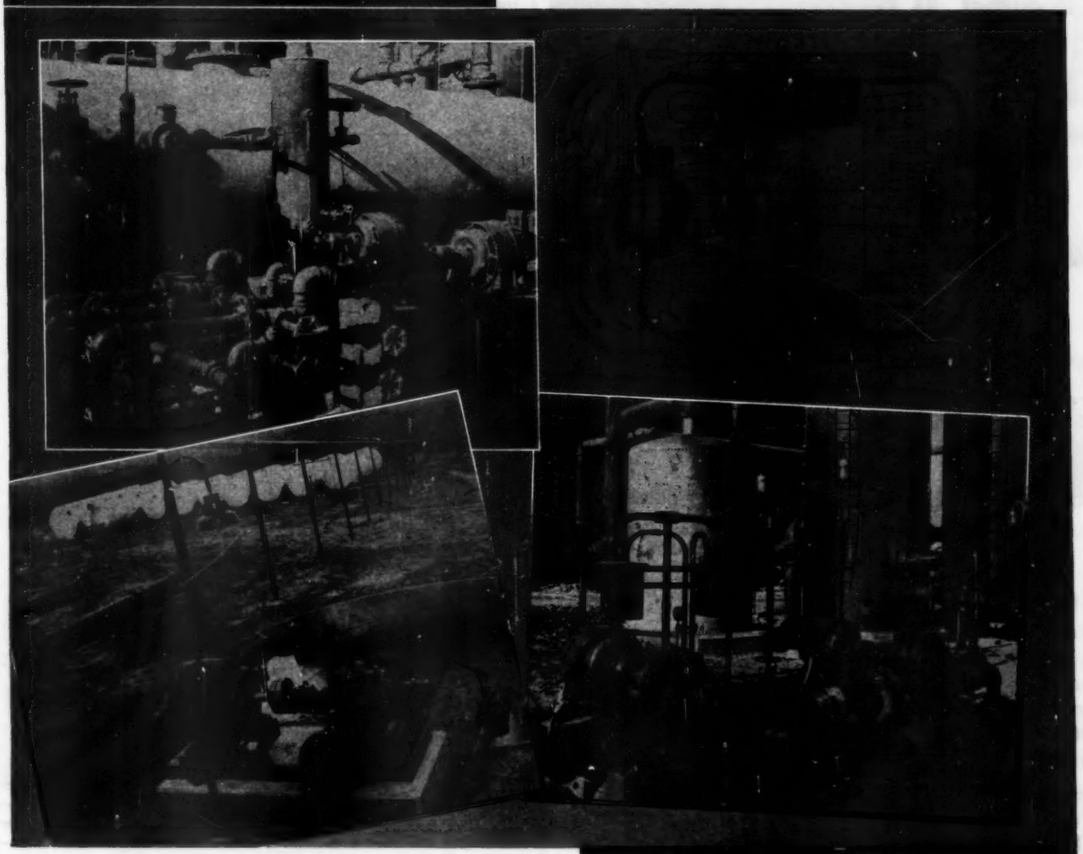

motors are to be found on the properties of many petroleum companies—preferred because they do not have to be protected, thus saving the expense of providing special buildings or sheds to house them—preferred because they need not be cleaned out periodically, thus eliminating expensive maintenance and incidental shutdowns—preferred, also, because of their wide diversification as to hp (from 2 to 60), rpm (450 to 3600) and type (seven different electrical types). » » » Write for Wagner Bulletin 151 completely describing these motors. » » »

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STAINLESS STEEL

EXPLAIN SOLUBILITY OF GAS IN CRUDE OIL

(Continued from Page 92)

gas-saturated sample for the subsequent laboratory work, the pressure is released from bomb (b), and its contents are discarded. The purpose of the upper bomb is to provide a means of completely filling the lower bomb with gas-saturated oil, without any free gas. At this stage of the operation, bomb (a) is ready to be prepared for drawing off the gas from the gas-saturated oil.

Field Laboratory Apparatus and Procedure

The upper bomb (b) is replaced by an assembly (Figure 1B) called the "separator." This assembly consists of a hydraulic nipple (f), ½x6 inches, a half-inch hydraulic tee (g), and needle valves (5) and (6), which are screwed into the top of the side outlets respectively of the tee. Pressure gauge (h) of suitable range is screwed into needle valve (5), and the needle valve (6) on the side outlet of the tee serves as the outlet for the gas coming out of solution as the pressure is released from bomb (a). The tee (g) and the nipple (f) are full of BB shot to reduce the space and to knock down any oil that may have a tendency to "foam up" into the separator from the lower bomb. While unscrewing the top bomb and replacing it with the separator, the temperature of bomb (a) is kept below 70° F. by means of an ice pack. After assembling, the separator and bomb are placed in a 70° F. bath, and the air in the separator assembly and in gauge (h) is exhausted by means of a vacuum pump; this evacuation was accounted for in subsequent measurements and calculations. Valve (6) is then closed, and stopcock (1), connecting the separator and bomb (a), is opened gradually; allowing the pressure to build up in the separator as slowly as possible. In the experiment represented by curve (1), Figure 2, the pressure in the bomb was reduced from 1,672 to 1,396 pounds per square inch during the first operation of releasing gas from bomb (a) to the separator. It took about 15 or 20 minutes for this pressure to become stabilized at the lower pressure. Throughout the period the bomb was hammered repeatedly. After the pressure became constant, gauge (h) was read, stopcock (1) was closed and the gas in the separator was drawn off slowly through rubber tubing connecting outlet needle valve (6) to calibrated 1-gallon bottles which had previously been filled with water. The gas in the calibrated measuring bottles and in the separator and tubing was brought to atmospheric pressure by means of a leveling bottle, and the volume of the gas liberated for each pressure drop was determined. At each gas-volume reading, the barometric pressure and the atmospheric temperature were recorded. It was assumed that the temperature of the gas in the bottles was the same as that of the atmosphere. The procedure of releasing gas from solution in the oil by stabilizing the pressure within the separator and bomb (a) and then collecting and measuring the gas contained in the separator, by manipulating valves (1) and (6), was repeated until the pressure in the bomb was reduced to atmospheric pressure. Upon opening the stopcock the second time (curve 1, Figure 2), the pressure stabilized at 1,263 pounds per square inch absolute, and the third opening reduced it to 1,079 pounds. As the pressure in the bomb was reduced, the procedure necessarily was changed. At lower pressures the volume of the separator and the gauge was not sufficient to produce a gas sample of suitable volume for complete analysis, as had been the case in the upper range of pressure. Therefore, to obtain a sample of sufficient volume for each successive pressure drop in the lower range, gas was drawn off slowly into the measuring bottles for a considerable time under control of valve (6) with stopcock (1) open. Before taking final observations on the sample being drawn, however, valve (6) was closed. With the closing of valve (6), pressure within the closed-in system built up, as indicated by consecutive readings on gauge (h). The closed-in system was then allowed to stabilize. Stabilization was accelerated by violently hammering the bomb. This hammering also had the effect of preventing a supersaturated condition of the oil in bomb (a). When the pressure became stabilized, stopcock

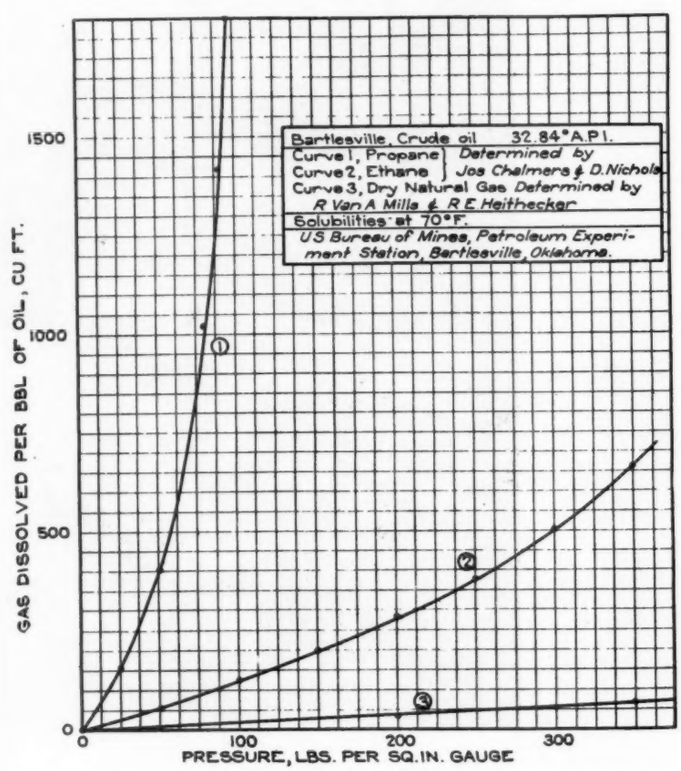

Figure 3—Variation of solubility with pressure, Bartlesville crude oil 32.84° A.P.I.

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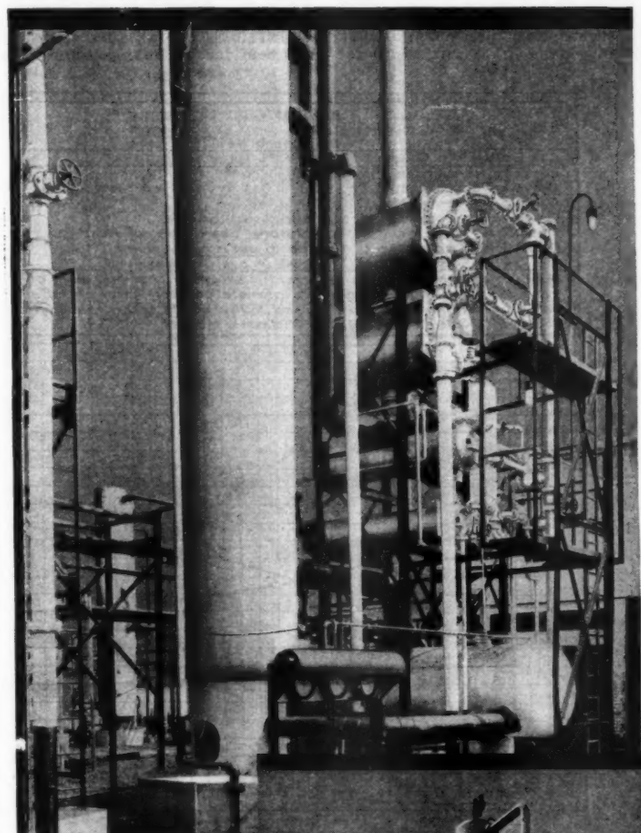

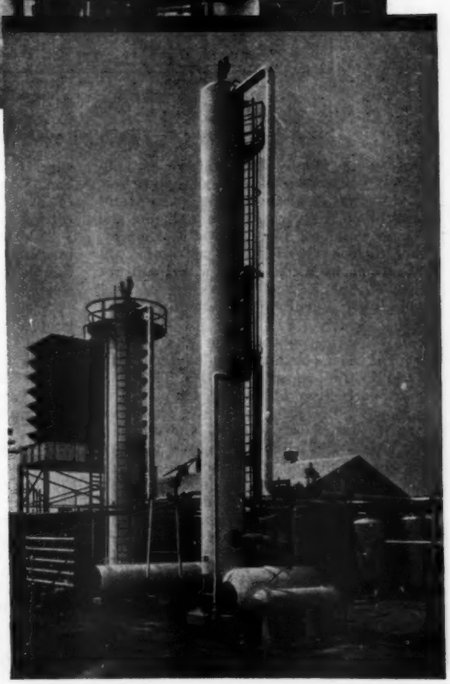

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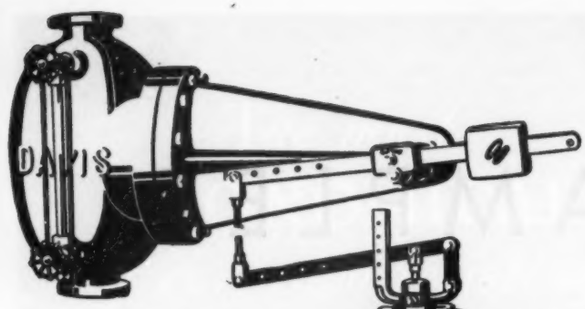

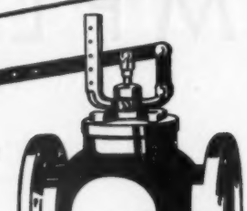

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(1) was closed, needle valve (6) opened slowly, and the gas under pressure in the separator assembly was drawn off and measured at atmospheric pressure in the manner applied to the upper range of pressures. In drawing off the final sample of gas in solution, the entire system was brought to atmospheric pressure with stopcock (1) and valve (6) open. The bomb was hammered violently.

Volume of Gas

The sum total of all of the gas given off at the different pressures was considered to be the total volume of gas originally in solution in the oil at the temperature and pressure under which the sample was taken at the well head. In arriving at amounts for calculation and for plotting curves to show pressure-solubility relationships, the actual total measured volume of gas was increased by an amount equal to the calibrated volume of the separator, the tubing connecting the separator with the measuring bottles and the shrinkage space above the oil in bomb (a) after the pressure was brought to atmospheric. The amount of gas in solution at any particular pressure could readily be obtained by subtracting the quantity of gas given off above that pressure from the total amount of gas given off in reducing the sample from the original well head pressure to atmospheric. The gas-volume observations were reduced to a temperature base of 70° F. and a pressure of 14.4 pounds per square inch absolute. A further correction was made for the presence of water vapor in the gas because the gas was constantly in contact with water in the measuring bottles. The combined correction factor for temperature, barometric pressure, and water vapor ordinarily varied between 0.87 and 0.94. In developing the solubility curves (Figure 2), the reduction of volume of the oil due to the liberation of dissolved gas and the amount of gas under pressure occupying this shrinkage space above the oil was taken into consideration. At high pressures, especially, this made a considerable difference in the solubility curve. To explain: In reducing sample represented by curve 1, Figure 2, from 1,672 to 1,396 pounds per square inch absolute, the gas actually measured in the bottles and corrected for temperature, pressure, and water vapor was 5,665 c.c. In liberating this volume of gas, the oil reduced in volume approximately 1.5 per cent. The shrinkage space above the oil in the bomb was filled with gas at 1,396 pounds pressure, which when expanded to atmospheric pressure would have amounted to about 932 c.c., neglecting its deviation from Boyle's law. The overall effect of this deviation was within the limits of experimental error, therefore the total amount of gas liberated between the pressure 1,672 and 1,396 pounds per square inch absolute was the sum of the gas volume actually determined in the bottles, separator and assembly, and the gas confined in the shrinkage space at the top of the bomb.

Shrinkage Determination

The following is a brief explanation of the method used in determining shrinkage:

1. The total shrinkage resulting from liberating the dissolved gases from any sample was obtained by measuring in a graduated glass cylinder the quantity of oil left in bomb (a) after the sample had been reduced to atmospheric pressure, and water vapor was 5,665 c.c. In liberating this volume of gas, the oil reduced in volume approximately 1.5 per cent. The shrinkage space above the oil in the bomb was filled with gas at 1,396 pounds pressure, which when expanded to atmospheric pressure would have amounted to about 932 c.c., neglecting its deviation from Boyle's law. The overall effect of this deviation was within the limits of experimental error, therefore the total amount of gas liberated between the pressure 1,672 and 1,396 pounds per square inch absolute was the sum of the gas volume actually determined in the bottles, separator and assembly, and the gas confined in the shrinkage space at the top of the bomb.

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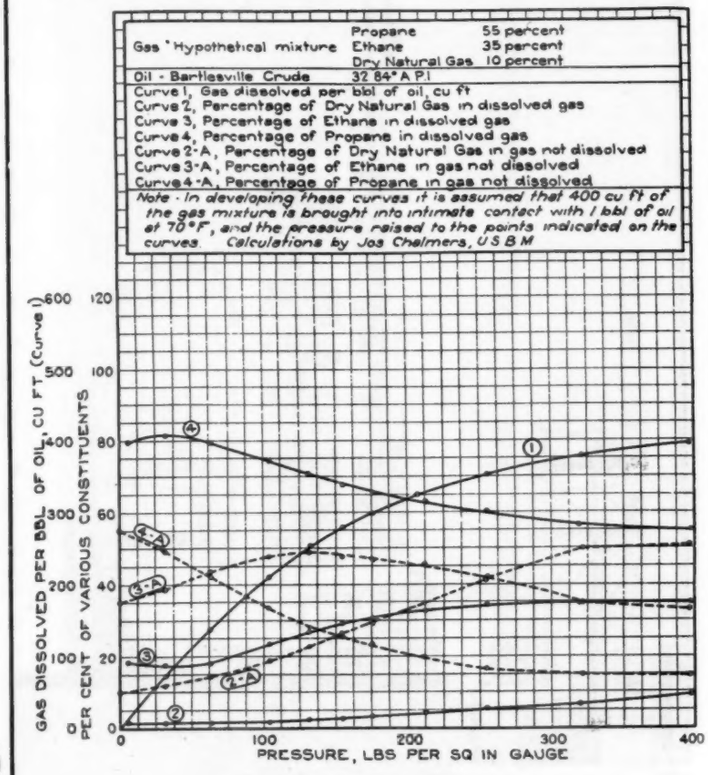

Gas - Hypothetical mixture
Propane 55 percent
Ethane 35 percent
Dry Natural Gas 10 percent
Oil - Bartlesville Crude 32.84° A.P.I.
Curve 1, Gas dissolved per bbl of oil, cu ft
Curve 2, Percentage of Dry Natural Gas in dissolved gas
Curve 3, Percentage of Ethane in dissolved gas
Curve 4, Percentage of Propane in dissolved gas
Curve 2-A, Percentage of Dry Natural Gas in gas not dissolved
Curve 3-A, Percentage of Ethane in gas not dissolved
Curve 4-A, Percentage of Propane in gas not dissolved
Note - In developing these curves it is assumed that 400 cu ft of the gas mixture is brought into intimate contact with 1 bbl of oil at 70°F, and the pressure raised to the points indicated on the curves. Calculations by Jos. Chalmers, U.S.B.M.
GAS DISSOLVED PER BBL OF OIL, CU FT (Curve 1)
PER CENT OF VARIOUS CONSTITUENTS
PRESSURE, LBS PER SQ IN GAUGE
0
100
200
300
400
500
600
20
40
60
80
100
120

Figure 4—Theoretical solubility curves.

2. The shrinkage at any intermediate pressure was determined by obtaining a sample at well-head pressure, and instead of allowing the sample to stabilize at well-head pressure, its pressure was gradually reduced by opening valve (3) at the top of bomb (b). If, for example, it was desired to determine the shrinkage at 400 pounds pressure per square inch, valve (3) was allowed to remain open until the pressure had reduced 50 or 60 pounds below the desired pressure. After closing valve (3), the pressure would be likely to build up to or above the desired pressure, and it would be necessary to vent more gas until the desired pressure was obtained. The sample would then be allowed to stabilize, and the procedure thereafter would be much the same as previously described. That is, the separator (Figure 1B) would be substituted for bomb (b), the gas would be drawn off into measuring bottles, and finally, when the sample was reduced to atmospheric pressure, the vol-

ume of the remaining oil in bomb (a) would be measured in a graduated glass cylinder. From this measurement, the shrinkage due to liberation of dissolved gases between the pressure of stabilization and atmospheric pressure could be determined. By taking several samples and stabilizing them at different pressures, a complete shrinkage curve, such as curve 1, Figure 7, could be developed.

Handling of Gas Samples Prior to Analysis

In the California work the liberated gas collected in the sample bottles was transferred to 1-gallon oil-sample cans, sealed and shipped to the laboratories of the Bureau of Mines at Bartlesville, Oklahoma., for analysis by fractional distillation at low temperatures. In the Oklahoma work, the bombs were transported from the field to the Bartlesville laboratories, where the gas was drawn off as described and the samples were allowed to remain in the calibrated measuring bottles until analyzed.

Solubility

Curves 1, 2, 3 and 4 of Figure 2 show the results of liberating the gas in solution from oil samples taken at well-

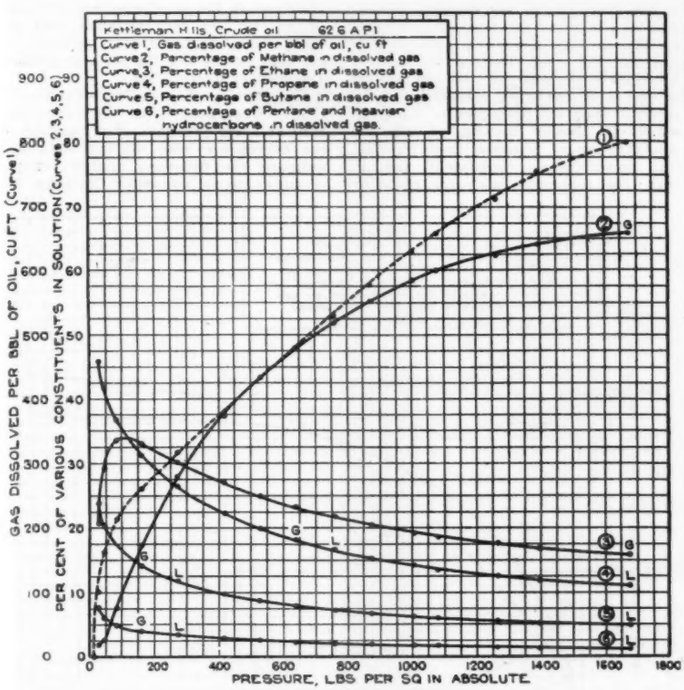


Figure 5—Solubility curves of gas in solution at 70° F. Kettleman Hills crude oil, 62.6° A.P.I.

head pressures and at a temperature of 70° F. These curves are selected for this preliminary report with the idea of offering data on oils covering the range of solubility factors, from almost the highest to the lowest determined. The oils also cover a wide range as to gravity and type.

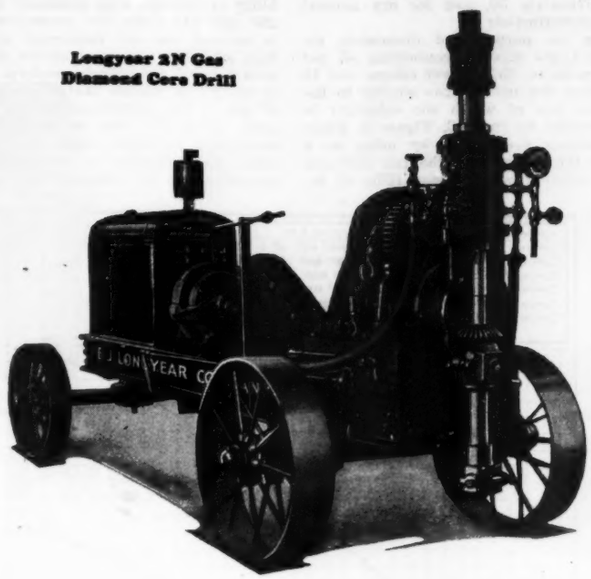
Curves 5 and 6 are taken from the reports of Beecher and Parkhurst, and Dow and Calkin, respectively, for the purpose of comparing the results of this investigation with data formerly obtained on the solubility of gas in oil. The dotted extensions of curves 5 and 6 were made by the author.

A comparison of the curves in Figure 2 shows the difference that exists between the data presented in this report and the results of former investigations. In the following discussion an attempt is made to explain some of these differences.

The foundation of most of the knowledge and thought relative to the solubility of gases in liquids is based upon the laws of Henry and of Dalton. According to Henry's law: "A given quantity of liquid will dissolve at constant temperature quantities (by weight) of the gas which are proportional to the pressure of the gas." Dalton found that: "When a mixture of gases dissolves in a liquid, each component dissolves according to its own partial pressure, that is, each dissolves in the liquid as if all others were absent."

It has been known for some time that these laws are not absolutely correct. Quoting from Taylor: "Henry's law like other gas laws is strictly applicable only to ideally dilute gases and fails to represent the facts when the concentrations become large."

A clear illustration of the deviation from Henry's law is shown in Figure 3, which was developed from laboratory experiments performed by Chalmers and Nichols, at the Petroleum Experiment Station of the Bureau of Mines, Bartlesville, Okla. It will be noted (Figure 3) that the solubility curve of natural gas (curve 3) developed from the data of Mills and Heithecker is a straight line and therefore conforms to Henry's law, whereas curves 1 and 2 for propane and ethane, respectively, are curved lines and show a deviation from Henry's law. The deflection of these curves, however, is in direct opposition to the deflection of solubility curves 1, 2, 3 and 4 of Figure 2. Therefore, obviously it is necessary to find some other explanation for the peculiar forms exhibited by the curves developed from data relating to the samples of gas-saturated oil which were obtained at high pressure from flowing wells. It is not necessary to look far to discover at least a partial explanation for these deflections. Consider first the significance of Dalton's law: ". . . each component dissolves according to its own partial pressure . . ." Although this law may fail in accuracy at high pressures, the author believes that the analysis of its application, which follows, will serve to explain in a large measure the general trend of the solubility curves presented in this report. In conjunction with Dalton's law, a related factor, "selective solubility," also must be taken into account. Consider, for example, the large quantities of natural gasoline that are often absorbed from comparatively dry natural gas by absorption oil in natural-gasoline plants. This concentration of heavy vapors is due to selective solubility. Figure 3 shows that at 25 pounds per square inch gauge the solubility factor expressed in cubic feet of gas per barrel of oil for propane is approximately 160, for ethane



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approximately 30, and for dry natural gas approximately 5.

For the purposes of discussion, assume a gas mixture containing 55 per cent propane, 35 per cent ethane and 10 per cent dry natural gas similar to the natural gas of which the solubility is represented by curve 3, Figure 3. These proportions are chosen by using as a guide the analysis of the gas liberated from solution in Kettleman Hills oil between pressures of 100 pounds per square inch absolute and atmospheric pressure. This analysis, as shown by the curves on Figure 5, is approximately 10 per cent methane, 35 per cent ethane and the remaining 55 per cent propane, butane and pentane.

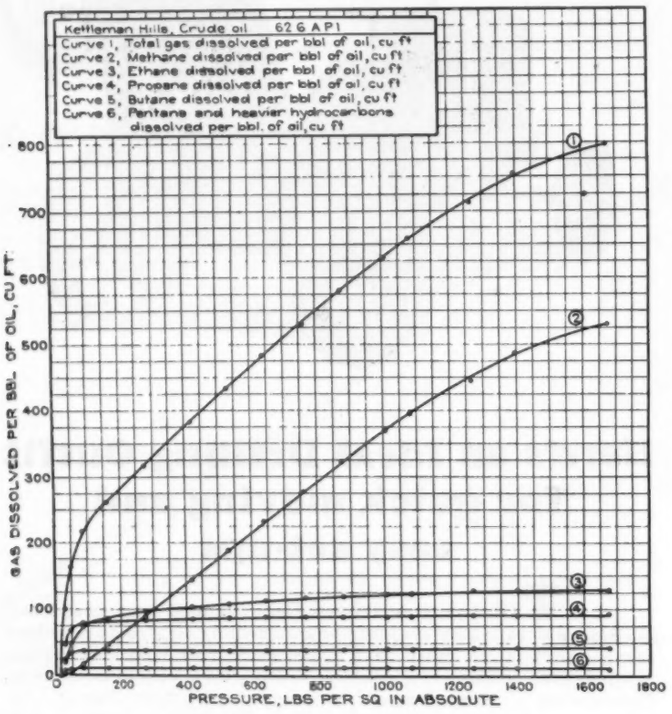
Kettleman Hills, Crude oil 62.6 A.P.I.
Curve 1, Total gas dissolved per bbl of oil, cu ft
Curve 2, Methane dissolved per bbl of oil, cu ft
Curve 3, Ethane dissolved per bbl of oil, cu ft
Curve 4, Propane dissolved per bbl of oil, cu ft
Curve 5, Butane dissolved per bbl of oil, cu ft
Curve 6, Pentane and heavier hydrocarbons dissolved per bbl. of oil, cu ft
GAS DISSOLVED PER BBL. OF OIL, CU FT.
PRESSURE, LBS PER SQ IN ABSOLUTE

Figure 6—Solubility curves of gas in solution at 70° F. Kettleman Hills crude oil, 72.6° A.P.I.

Theoretical Result

The theoretical result of contacting 400 cubic feet of this hypothetical gas mixture with a barrel of crude oil has been calculated by Chalmers and is shown graphically in Figure 4. In these calculations, the solubility factors were determined from the curves shown in Figure 3, and the gases were assumed to dissolve in the oil in accordance with Henry's and Dalton's laws.

If 400 cubic feet of the specified gas mixture is contacted with a barrel of the crude oil used in the experiments recorded graphically in Figure 3 (32.84° A.P.I. gravity), and if the solubility factors indicated by Figure 3 are used, calculation based upon Henry's laws and Dalton's laws will show the results indicated in Figure 4. The curves in Figure 4 are not entirely dissimilar to those in Figures 2, 5 and 6. Compare the solubility curve (curve 1, Figure 4) with the corresponding curve (curve 1, Figure 5). Figure 5 is a graphical presentation of the results obtained from Kettleman Hills crude oil of 62.6° A.P.I. gravity. At 50 pounds per square inch gauge pressure, the theoretical curve (curve 1, Figure 4) shows a solubility of 113 cubic feet of gas per barrel of oil, whereas at 65 pounds per square inch absolute (50 pounds gauge) pressure, the Kettleman Hills oil shows a solubility of 193 cubic feet of gas per barrel of oil. Solubility of the hypothetical gas-mixture factors at gauge pressures of 100, 200 and 300 pounds per square inch is 205, 318 and 372 cubic feet of gas per barrel of oil, respectively, as indicated by the theoretical curve, whereas from curve 1, Figure 5, solubility at corresponding pressures is 235, 293 and 341 cubic feet respectively. It is believed that the theoretical and actual solubility curves as shown in Figures 4 and 5 respectively, conform closely enough to indicate that the solubility of gas in oil, plotted against the pressure, does not give a straight line throughout the entire range of pressures when the solubility is determined by measuring the gas released from an oil-gas mixture obtained under pressure from a natural reservoir.

In solving the foregoing hypothetical example, the results of which are shown graphically in Figure 4, attention is called to the fact that the conditions stated were definite and limited; that is, the quantity of gas was 400 cubic feet and the quantity of oil was 1 bbl. Similar conditions are found in nature; not necessarily in the same proportions, but certainly a definite amount of oil and a definite amount of gas exist in an undisturbed, natural oil reservoir. During geologic time these components reached a state of equilibrium. The gases that were capable of being absorbed under the definite conditions of temperature, pressure and ratio of the total quantity of gas to the total quantity of oil have long since been absorbed. The remainder of the gas, if there is an excess, remains associated with the oil but not dissolved in it.

It is important to consider these facts in defining and solving problems similar to that represented by Figure 4. A study of the curves in Figure 4 shows the selective solubility of the constituents of the hypothetical mixture at different pressures. For example, it will be seen that at 50 pounds per square inch pressure, 112 cubic feet of the hypothetical gas mixture was in solution (Curve 1). It is seen also that at 50 pounds pressure, 81 per cent of the gas in solution was propane (Curve 4). Therefore, 91 cubic feet of the total gas at 50 pounds pressure was propane. By similar procedure it was found that an additional 62 cubic feet of propane was in solution at 100 pounds; and of the remaining 67 cubic feet of propane, all but 8 cubic feet was in solution at 250 pounds pressure per square inch. The selective solubility of propane is well illustrated when these figures are compared with the amount of dry natural gas that was in solution at the same pressures. The figures for dry natural gas at these pressures are 1.5, 4.0 and 19.0 cubic feet per barrel of oil, respectively (Curve 3, Figure 3). Thus, at a pressure of 250 pounds per square inch gauge, 212 cubic feet of propane was in solution, whereas only 24.5 cubic feet of dry natural gas was dissolved.

Selective Solubility

This selective solubility naturally changed the composition of the gas not in solution. It will be remembered that the hypothetical gas mixture originally contained 10 per cent of dry natural gas, 35 per cent of ethane and 55 per cent of propane. Compare these figures with the analysis of the gas not in solution at 250 pounds pressure as indicated by curves 2-A, 3-A and 4-A of Figure 4. This indicated analysis is: Ethane, 42 per cent; dry natural gas, 41 per cent, and propane, 17 per cent. Of course these calculated analyses are not strictly correct, for the reason that no correction is made for the effect of the vapor pressure of the oil. This correction, particularly for weathered oil, would be so small that it has been disregarded in the present hypothetical case.

In the theoretical problem dealing with a hypothetical gas mixture, no account has been taken of the changes in volume, specific gravity and other properties of the oil that occur progressively as the oil absorbs the gas. If the composition of liquid is changing progressively, dependent upon the properties of the gases which it absorbs because of selective solubility under pressure (and liquefaction under certain conditions), and, in turn, the contacted gases are changing progressively in composition, it would not be expected that a straight-line relationship will exist between the solubility of the gas mixture in the liquid and the corresponding pressures.

In comparing the results of the present investigation with those of other investigators, it should be realized that they measured the solubility of a gas, containing some hydrocarbons relatively high in the series, in oil composed of hydrocarbons relatively low in the series. Under these conditions and under the further condition that no definite limit was placed on the quantities of oil and gas used, it might be expected that the solubility curves, within the range of pressures used, would be straight, or nearly so. In the present investigation, the entire range of hydrocarbons was represented in the gas and liquid. Some of the hydrocarbons that were gaseous under low pressure were in the liquid phase under high pressures.

In further explanation of the straight-line relationship, it may be well to consider the methods used where straight-line solubility curves were obtained. According to the published reports of these investigations, a new sample of weathered oil and a fresh sample of gas were used at each pressure point, and therefore the conditions of the tests reported by Beecher and Parkhurst and Dow and Calkin did not permit the progressive action of selective solubility. In other words, the gas that was put into solution at high pressures had the same constituents, in the same proportions, as the gas that was put into solution at low pressures. These conditions are not directly comparable with natural conditions in oil reservoirs, and therefore the oil-gas mixtures resulting from contacting oil and gas in the method described do not duplicate the oil-gas mixtures obtained under pressure directly from flowing wells.

Nature of the Gas in Solution

Curves 2, 3, 4, 5, and 6 (Figures 5 and 7) show percentages of the various components of the gas in solution at various pressures. The curves in Figure 5 indicate that the entire volume of gas dissolved at the maximum pressure contained 66.1 per cent methane, 16.1 per cent ethane, 11.3 per cent propane, 5.2 per cent butane and 1.3 per cent pentane and heavier hydrocarbons.

The action of selective solubility is clearly illustrated when the curves are read at lower pressure. For example, if the curves are read on the 100-pound ordinate, the following analysis of the dissolved gas is indicated: Methane, 9.8 per cent; ethane, 33.8 per cent; propane, 35.3 per cent; butane, 16.5 per cent; pentane and heavier hydrocarbons, 4.6 per cent.

The effect of selective solubility is shown by Curve 1, Figure 5. At an absolute pressure of 100 pounds per square inch, 230 cubic feet of gas were in solution per barrel of oil, whereas at the maximum pressure of 1,672 pounds per square inch absolute, the gas in solution is not 16.72 times the quantity in solution at 100 pounds but only 3.48 times this amount, or 800 cubic feet per barrel of oil.

Curves 2, 3, 4, 5 and 6 (Figures 5 and 7) were developed from the results of the fractional distillation analyses of the gas samples, liberated at the several observation pressures, to show the percentages of the constituents of gas in solution at those pressures. The total gas remaining in solution at any given pressure was considered to be 100 per cent,

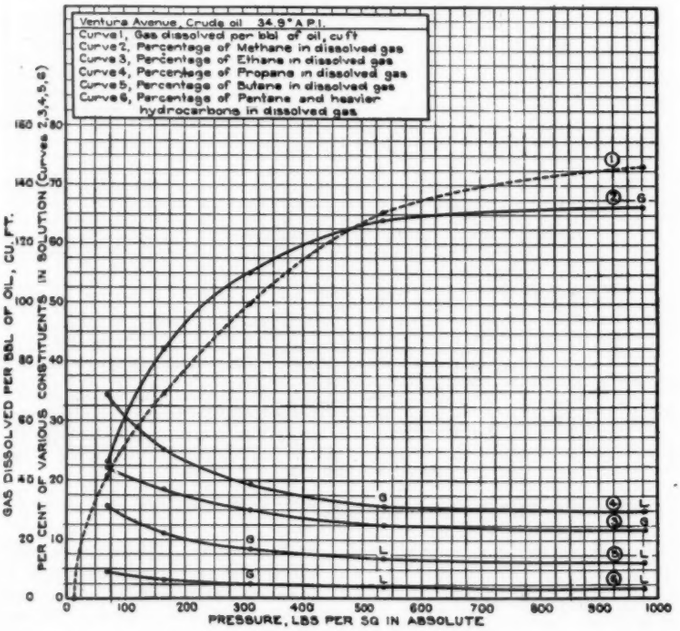
Ventura Avenue, Crude oil 34.9° A.P.I.
Curve 1, Gas dissolved per bbl of oil, cu ft
Curve 2, Percentage of Methane in dissolved gas
Curve 3, Percentage of Ethane in dissolved gas
Curve 4, Percentage of Propane in dissolved gas
Curve 5, Percentage of Butane in dissolved gas
Curve 6, Percentage of Pentane and heavier hydrocarbons in dissolved gas
GAS DISSOLVED PER BBL. OF OIL, CU. FT.
PER CENT OF VARIOUS CONSTITUENTS IN SOLUTION (Curves 2,3,4,5,6)
PRESSURE, LBS PER SQ IN ABSOLUTE

Figure 7—Solubility curves of gas in solution at 70° F. Ventura Avenue crude oil, 34.9° A.P.I.

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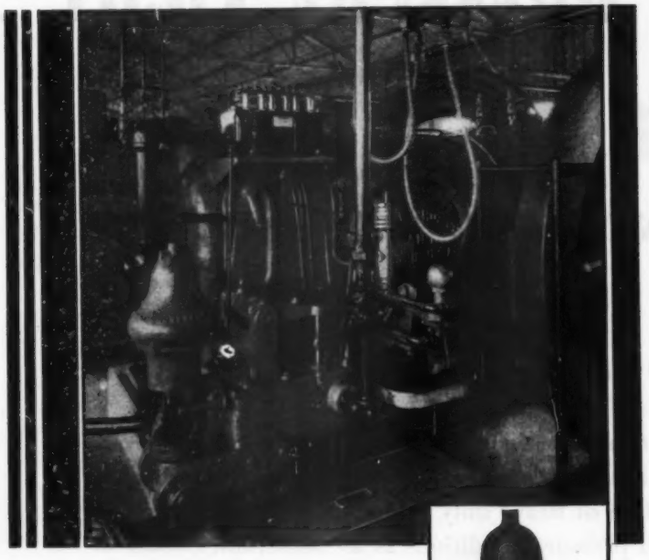

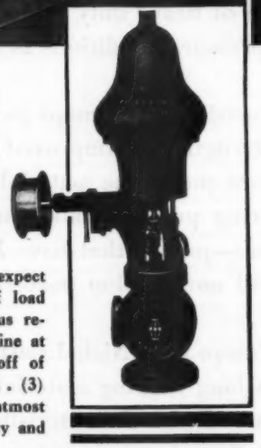

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even though the actual volume of all of the components of gas in solution at that pressure may have been only a certain percentage (for example, 25, 33, or any other actual per cent) of the total gas liberated throughout the entire pressure drop of the well-head sample from its initial pressure to atmospheric. The individual points for plotting the curve representing each component were obtained by arithmetical computations based upon the method of proportional parts.

The data shown in Figure 5 may be presented in another way. In Figure 6 the amounts of the various components of the gas in solution at any given pressure are plotted on the basis of cubic feet per barrel of oil instead of on the percentage basis used in plotting Figure 5.

Solubility Factors

The oil represented in Figure 5 has one of the highest solubility factors and the oil represented in Figure 7 has one of the lowest solubility factors of all of the oils tested. These charts have several interesting features. Attention is called to the peculiar reverse form taken by the ethane curve (3) at the 100-pound ordinate. in Figure 5. Ethane is liberated in such large quantity at pressures below 100 pounds per square inch absolute that it might be thought to be changing from the liquid to the gaseous phase. This is not believed to be the case, however, as under the conditions of the test the partial pressure of ethane was below 573 pounds, and therefore the ethane must have been in the gaseous phase throughout the entire range of pressures. Hence, it is marked G (gas) at the maximum pressure. The heavier gases, however, are believed to have been in the liquid phase at the maximum pressure, as their respective partial pressures were sufficiently high to liquefy them at the existing temperature, 70° F. Propane remained a liquid until the pressure was reduced somewhat below 760 pounds per square inch absolute (Curve 4, Figure 5). The letter L indicates that it was in the liquid phase at that pressure and the letter G indicates the gaseous phase at 640 pounds per square inch absolute. Phase points G and L are also shown for butane and pentane, on Curves 5 and 6 (Figure 5), respectively. It was rather surprising to find that phase changes apparently have little effect upon the liberation of the various gas components. Possibly this is due to the fact that the various liquid hydrocarbons are infinitely soluble in each other—in other words, they are miscible in all proportions—and as the pressure on a hydrocarbon such as propane approaches the liquefaction pressure, the propane gas approaches "infinite solubility." Curve 1, Figure 3, seems to give credence to such an explanation. This curve tends to become vertical and therefore indicates infinite solubility as the pressure approaches 100 pounds per square inch gauge, although propane would remain in the gaseous state at 70° F. until a pressure of approximately 109 pounds per square inch gauge is reached. It is quite possible that the ethane curve (2, Figure 3) would show similar characteristics if its vapor pressure, approximately 573 pounds per square inch absolute at 70° F., were approached. A study of Curve 2, Figure 3, shows that at a pressure of approximately 250 pounds per square inch gauge this curve for ethane begins to deflect with an increasingly upward trend (its slope becomes greater with increased pressure), and if the pressure were increased to 550 pounds per square inch gauge, it is believed likely that the curve might become nearly vertical. From the data shown in Figure 3, however, there is no reason to believe that a methane curve would show an upward deflection, as the critical temperature of methane is —82.1° C. or —116.2° F., and therefore, regardless of pressure, it could not approach liquefaction at 70° F.

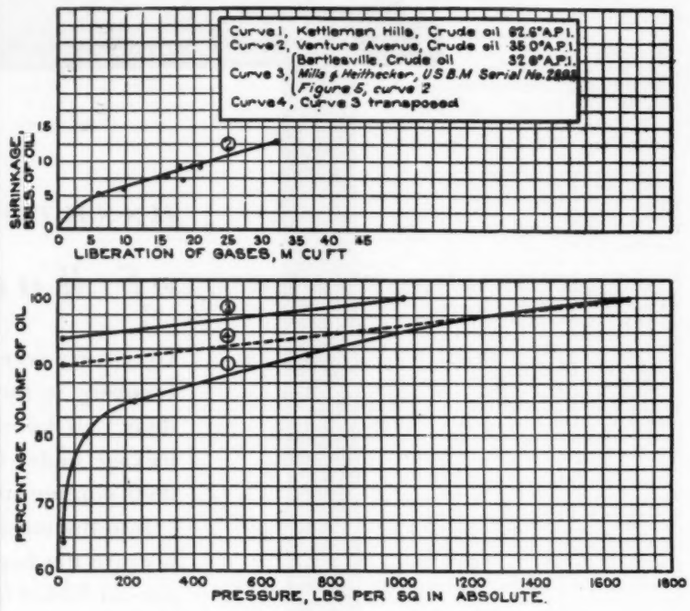
Curve 1, Kettleman Hills, Crude oil 62.6°A.P.I.
Curve 2, Ventura Avenue, Crude oil 35.0°A.P.I.
Curve 3, Bartlesville, Crude oil 32.6°A.P.I.
Mills & Heithecker, U.S.B.M. Serial No. 2893
Figure 5, curve 2
Curve 4, Curve 3 transposed
SHRINKAGE, BBLS. OF OIL
0 5 10 15
0 5 10 15 20 25 30 35 40 45
LIBERATION OF GASES, M CU FT
PERCENTAGE VOLUME OF OIL
100 90 80 70 60
0 200 400 600 800 1000 1200 1400 1600 1800
PRESSURE, LBS PER SQ IN ABSOLUTE.

Figure 8—Shrinkage of oil due to liberation of dissolved gases.

One of the interesting features of Figure 7 is that propane is in solution in greater quantity than ethane in the Ventura Avenue oil. This oil is the only one tested so far that has shown this peculiarity. Also, no reverse appears in the ethane curve for this oil, as was the case for the Kettleman Hills crude shown in Figure 5. It is believed that such a reverse in the curve probably would have appeared if it had been practical to have taken gas samples at intermediate pressures between 68 pounds per square inch absolute and atmospheric pressure.

Shrinkage

Mills and Heithecker have reported the results of their experiments relating to the changes in volume of certain crude oils due to the solution of gas in those oils. In their experiments, the oils contained hydrocarbons relatively low in the series, and the gas dissolved in the oils contained hydrocarbons relatively high in the series. As the intermediate hydrocarbons, if present at all, were in relatively small amounts, it is not surprising that straight-line shrinkage curves were obtained as shown in Curve 3, Figure 8. Curve 4, Figure 8, is a straight line of the same slope as Curve 3; it was plotted from the 100 per cent point at 1,672 pounds per square inch absolute for Kettleman Hills crude of 62.6° A.P.I. gravity.

Curve 1, Figure 8, shows the volu-

metric changes at various pressures undergone by Kettleman Hills oil when its dissolved gas was liberated from 1,672 pounds pressure per square inch absolute to atmospheric pressure. Its volume at the maximum pressure is assumed to be 100 per cent. It is well to point out here that extreme accuracy is not vouched for in these shrinkage determinations, as the apparatus (Figure 1) was not designed for this purpose, and it was only through arduous and complicated procedure that H. C. Miller and the writer obtained the approximate data shown by Curves 1 and 2, Figure 8.

Curve 1, Figure 8, shows that a wellhead sample of Kettleman Hills crude oil of 62.6° A.P.I. gravity sustained a loss in original volume of approximately 36 per cent when the pressure was reduced from 1,672 pounds per square inch to atmospheric. During this reduction in pressure, at a constant temperature of 70° F., an equivalent of 800 cubic feet of gas per barrel of oil was liberated (Curve 1, Figure 5). Although true bottom-hole conditions of pressure and temperature in the well from which the sample was taken (or adjacent wells) are not known, it is not unreasonable to suppose that withdrawal of gas from solution in the reservoir will cause a reduction in volume of the liquid content of that reservoir which is comparable, and of the same order, with the results obtained in the present oil shrinkage study. If the above assumption is true, and knowing that 800 cubic feet of gas were liberated per barrel of 62.6° A.P.I. gravity in a pressure reduction of wellhead samples from 1,672 pounds per square inch to atmospheric, it could then be said that the total liquid content of the reservoir will have been reduced in volume approximately 0.36 bbl. for each 800 cubic feet of gas liberated from solution within the pressure range covered by the experimental work. This amount of shrinkage would be in addition to the depletion that can be measured in actual barrels of oil produced. The full significance of this shrinkage factor in computing normal decline and ultimate production of natural reservoirs which are under so-called volumetric control has not yet been determined.

It was necessary to plot Curve 2, Figure 8, of the Ventura Avenue crude on an entirely different basis from that used in plotting Curves 1 and 3, because of the wide variation in the solubility factors of this oil at virtually the same pressures. This variation in solubility probably was due to the fact that the well flowed by heads with a variation in pressure of more than 200 pounds per square inch during the process of taking an oil sample. The maximum pressure of 977 pounds per square inch absolute for the Ventura Avenue sample (Curve 1, Figure 7) is the pressure of stabilization after the bomb was disconnected from the well. Actually during the progress of taking this and other samples of Ventura Avenue oil, the well pressure at times went below and above the final pressure of stabilization. However, the pressure recorded was probably more constant than any other pressure observed during the sampling period.

Curve 2, Figure 8, shows that for each 32,000 cubic feet of dissolved gas that is liberated from this oil, within the range of pressures covered by the experimental work, there is indicated a possible shrinkage of at least 13 bbls. of liquid content of the reservoir, in addition to the depletion caused by the oil produced. Curve 2, Figure 8, also brings out a fact that is not shown directly in Curve 1, Figure 8. It shows that equal volumes of dissolved gas do not result in equal volumetric changes in the oil; for example, 5,000 cubic feet of the heavier gases occupy a space equal to 5 bbls., or roughly, an equivalent of 24 cubic feet per gallon. Comparison of the upper and lower ranges of this curve indicate that the oil shrinkage due to the liberation of the lighter gases is about one-third that of the heavier gases. This condition probably can be explained by the fact that the molecules of the heavier gases are composed of a greater number of atoms than the molecules of the lighter gases, also, they are actually larger in size and therefore occupy more space when in solution than do an equal number of molecules of the lighter gases. When out of solution, however, equal numbers of molecules of different gases occupy the same space when under the same temperature and pressure in accordance with Avogadro's law.

Gravity of the Oil

The gravity of the gas-saturated oil under pressure was not observed. However, it is not particularly difficult to arrive at an approximate value for this figure, by estimating the weight of the various gas constituents liberated. A gram molecule of any gas has a volume of approximately 22.4 liters at 0° C. and 760 mm. At 70° F. and 14.4 pounds pressure per square inch absolute, this volume would be 24.63 liters. Knowing the volume of the various components liberated, their combined weight in grams can be calculated. Also by knowing the volume of the bombs, which were filled originally with gas-saturated oil, and the volume and specific gravity of this oil when reduced to atmospheric pressure at 70° F., the weight of the original gas-saturated oil sample is the sum of the weights of the gas liberated and the oil recovered. Its specific gravity can be determined by dividing the weight of the gas-saturated oil in grams by its volume in cubic centimeters.

Such calculations have been made with reference to the oils represented in Figures 5 and 7, and results are shown in Table 1.

TABLE 1—ESTIMATE OF GRAVITY OF GAS-SATURATED CRUDE OIL

Kind of oil—	Gravity, °A.P.I. at atmos. pres.	Gravity of gas-saturated oil at well head pres., °A.P.I. (computed)	Well-head pressure of gas-saturated oil, lbs. per sq. in. abs.
Kettleman Hills	62.55	102.30	1,672
Ventura Avenue	34.87	38.94	977

It is interesting also to compare the gravity of the oils recovered after the dissolved gas had been liberated gradually to atmospheric pressure, with the gravity of these oils, as reported by the operators. Table 2 shows this comparison.

TABLE 2—EFFECT OF RATE OF LIBERATING DISSOLVED GASES UPON THE GRAVITY OF THE OIL

Field—	No. of samples	Average gravity of oil recovered in experiments, °A.P.I.	Gravity reported by operators °A.P.I.
Kettleman Hills	7	63.1	61.0
Kettleman Hills	5	44.8	40.0
Ventura Avenue	8	35.0	32.0
Oklahoma City.	2	43.0	39.9

The higher gravity resulting from gradual reduction of pressure is undoubtedly due to the retention by the oil of part of the propane fraction, large quantities of butane and pentane, and possibly some of the heavier hydrocarbons, which in field operations usually are carried away by a rapidly moving stream of gas when the pressure is released suddenly within the system. A system of trapping that would accomplish gradual separation at the highest possible pressures might be the means, under certain conditions, of not only increasing the value per barrel of the oil produced but also of increasing the quantity of oil by causing it to retain certain hydrocarbons which under ordinary trapping systems would become a part of the gas.

Nature of Gas Not in Solution at High Pressures

A sample of gas was taken from the delivery valve (3) of the upper bomb (b) (Figure 1) during one of the tests on the well at Kettleman Hills for which solubility curves are given in Figure 5. This sample of gas is believed to be representative of the free gas that was not dissolved in the oil at a pressure of 1,672 pounds per square inch absolute and 70° F. The following is its analysis: Methane, 85.6 per cent; ethane, 8.0 per cent; propane, 3.6 per cent; butane, 1.7 per cent; pentane and higher, 1.1 per cent.

By calculation, based upon field data not included in this present report, it

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has been estimated that the quantity of gas not in solution at a pressure of 1,672 pounds per square inch absolute and 70° F. was equal to approximately 95.4 per cent of the total gas delivered by the well; also, other calculations indicate that this 95.4 per cent portion of the gas which was undissolved under the stated conditions contained approximately 91 per cent of total butane produced by the well.

Calculations have been made for the purpose of estimating the amount of natural gasoline contained in the gas not in solution at a pressure of 1,672 pounds per square inch absolute and 70° F. These calculations take into account the heavier fractions contained in the "pentane and higher fraction" and also take into account the fact that the final natural gasoline product which is produced in plant operation must not contain more than 31 per cent butane. The results of these calculations indicate that the gas not in solution at 1,672 pounds per square inch absolute and 70° F. contained approximately 0.411 gallon of pentane and heavier hydrocarbons per 1,000 cubic feet and 0.326 gallon of butane per 1,000 cubic feet; or, such gas contained a total of approximately 0.737 gallon of natural gasoline per 1,000 cubic feet.

General Statement

The results of this investigation show the solubility of gas in certain crude oils at various pressures from 1,686 pounds per square inch absolute to atmospheric, and at a temperature of 70° F. They do not show the solubility at the very high pressures which may exist underground and at temperatures of possibly 200° F. or more which have been indicated by geothermal studies. Whether the solubilities existing underground are greater or less than those shown in Figure 2 is not known. It is known, however, that increased pressure increases the solubility of gas in crude oil, and that within certain limits increased temperature decreases the solubility. It is known also that in distillation an increase in temperature results in the liberation of dissolved gases, and portions of the oil that are liquid at lower temperatures are vaporized at higher temperatures. In comparing the effect that experimental conditions had upon the results reported in this investigation with the effect that might be obtained if the experimental conditions approximated natural conditions more closely, the partly counteracting influences of increased pressure and of temperature must be considered. Higher pressures closely approximating those existing underground would cause more gas to be in solution in the oil (or to be in the liquid state) than the results obtained from well-head samples at flowing pressures have indicated. The effect of higher temperatures upon the solubility of natural gas in crude oil would be to decrease the amount in solution of the less soluble gases, methane for example, and to increase the liberation of the more soluble gases, propane and butane, that remain in solution in considerable quantity when a sample is reduced to atmospheric pressure at a temperature of 70° F. That these more soluble gases remain in solution in considerable quantity at atmospheric pressure and temperature is indicated in the introduction of this paper, where reference is made to the quantity of gas liberated by applying vacuum to Burbank crude oil. In addition to the increased liberation of the more soluble gases, certain hydrocarbons that would be in the liquid state at 70° F. would be vaporized at higher temperatures.

An estimate of the combined effect of these several and presumably counteracting factors upon solubility, shrinkage and amount of recoverable vapor when samples are reduced to atmospheric pressure under different temperature conditions is not attempted in this preliminary report.

DATA ON BOTTOM HOLE PRESSURES IN OIL WELLS

(Continued from Page 95)

only 15 pounds, showing that the tubing filled with fluid almost as fast as the gas pressure in the tubing could be released. The chart shown in Figure 5 was taken in a well producing at the rate of 2,200 bbls. of oil and 2,500,000 feet of gas per day through 8⅝-inch casing. The chart shows pressures at intervals of 250 feet in the flowing column of oil and gas. The excessive vibration of the gauge while at 3,925 feet was probably caused by the gauge hanging opposite a stratum of pay sand. The chart reproduced in Figure 6 was taken in a pumping well and is explained in a later paragraph. These charts are representative of a large number that have been obtained in wells producing under a wide variety of conditions.

Application of Bottom-Hole Pressures

The value of determining pressures in different formations while drilling through them is shown in the following table. These pressures were obtained in wells in the Carr City Pool in the Seminole district, Seminole County, Oklahoma:

Formation—	Top (feet)	Bottom (feet)	Pressure (lbs.)
Hunton	3,980	3,910	1,520
Simpson	4,068	4,124	1,152
First Wilcox	4,124	4,142	*637
Second Wilcox ..	4,217	....	†800

*Simpson and first Wilcox open to hole.
†Estimated from increase in fluid level.

Measured pressures in these formations permit certain precautions which might otherwise be overlooked. For example, in drilling it is the universal practice in the Seminole district to produce the small amount of oil which may occur in the Simpson with the "first Wilcox" sand. As these sands are usually drilled with cable tools, the much higher pressure in the Simpson would cause oil to flow from the hole into the "Wilcox" sand when the porous part of the "Wilcox"

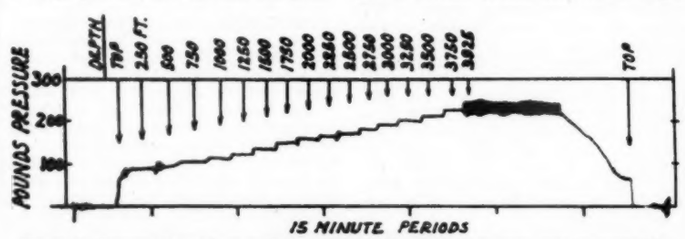

Figure 5—Pressure chart from well flowing naturally. The instrument was suspended for a time at each of the indicated depths.

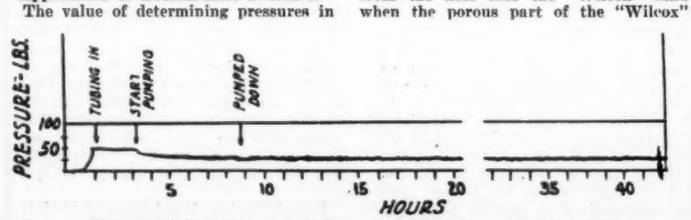

Figure 6—Record of pressure below working barrel in a pumping well.

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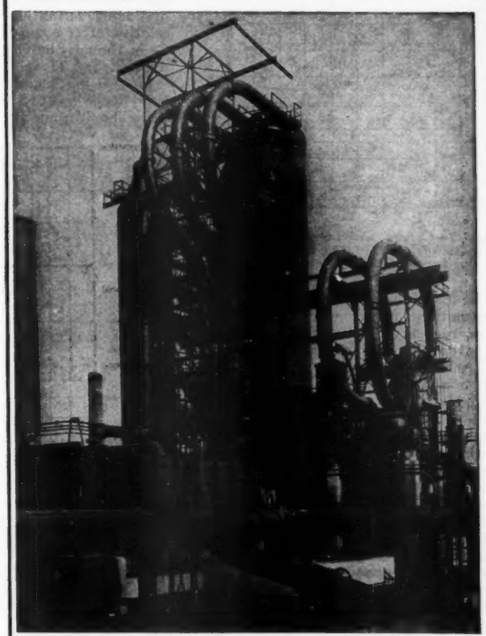

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is first encountered, and if the hole were not free from the drill cuttings they might be packed so tight around the bit that a fishing job would result. It is not uncommon to find a large difference in the original pressures in formations that are separated by a relatively short vertical distance.

Formation Pressures

The formation pressures and the production of four wells for 10 months are shown graphically in Figure 7. These wells are located in South Earlsboro Pool, Sections 22 and 23, Township 9n, Range 6e, in Seminole County, Oklahoma. The pool is known to have encroaching edgewater forming a natural water flood, the static head of which is the same as the original pressure in the field. Under such conditions it is reasonable to expect the water to have considerable effect on the rate of decline of production and on the formation pressure in the area adjacent to any individual well. If the oil and gas are removed from the reservoir faster than the water encroaches, the formation pressure, and therefore the rate of recovery, will decline as in the first part of the curves shown in Figure 7 for Amerada Petroleum Corp.'s No. 2 Edwards and No. 2 Grounds wells. When the production of oil and gas decreases to such a rate that water replaces it at the same rate as it is removed, both the formation pressure and the rate of recovery should be constant, as in Amerada's No. 2 Edwards after July, after September in No. 5 Grounds and throughout No. 5 Edwards. When the flood approaches the well, there will be an increase in the formation pressure and also the rate of production, as in No. 2 Edwards and No. 5 Edwards in January. When the water reaches the well, the rate of recovery will decrease and the pressure will remain constant or may increase as in No. 2 Grounds after November and No. 5 Grounds after July. While correlation of the oil production, formation pressures, and water encroachment in these wells is obvious, it is probable that if the bottom-hole pressure were available during each of the production tests, a correlation between the pressure differential in the formation and the rate of production would permit a broader and more definite interpretation.

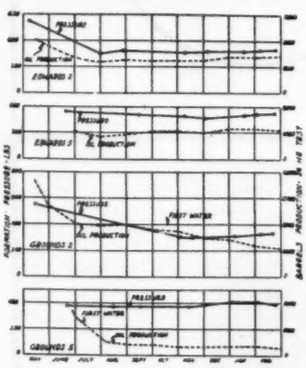

Figure 7—Curves showing relationship of formation pressure to the rate of oil production; (24-hour potential test).

Mathematical Relationship

Pierce and Rawlins have determined a mathematical relationship of rate of production and differential pressure within the producing formation for gas wells. A similar correlation has been found in certain oil wells in the Yates Field and in the Seminole district. Moore has given other relations of the rate of production and pressure differentials in the sand. Data on two wells in the Seminole district worked out according to the method of Pierce and Rawlins, are given in Figures 8 and 9. The data in Figure 8 were taken in a well producing from the Wilcox sand where the formation pressure was 412 pounds, and in Figure 9 in a well producing from the Hunton lime in which the formation pressure was 1,520 pounds.

Slope of Curve

Pierce and Rawlins also found that when this rate of production was expressed by a curve that the slope of the curve did not change with depletion. While sufficient data have not been obtained to determine what the effect of depletion may have on the correlation in oil wells, it is believed that it may not be so simple as in gas wells. In gas wells the same fluid is moving through the sand at all stages of depletion while in oil wells the characteristics of the fluid change as the production is depleted, principally due to a change in the absolute gas-oil ratio. Other differences of lesser importance such as change in gravity of oil, and gravity of gas, including that due to some of the lower hydrocarbons which were originally in liquid state becoming gas, and change of size of drainage channels due to erosion within the producing formation may affect the correlation after some depletion has occurred. Even though the slope is changed, a correlation should still exist which can be expressed mathematically, but it will require more tests to determine than if the slope should remain constant. The application of this relationship in prorated fields should be especially important. Potential production might be established without opening any well to its open flow capacity. This would save gas, extra labor, and lessen the danger of bringing in bottom water. It deserves much attention in this connection.

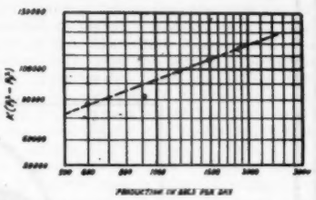

Figure 8—Curve showing the relationship between formation pressure (Pf) minus bottom hole pressure (Pp), and rate of oil production.

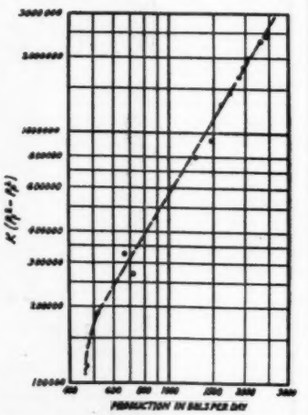

Figure 9—Curve showing the relationship between formation pressure (Pf) minus bottom hole pressure (Pp), and rate of oil production.

Series of Tests

The relation of rate of production, casinghead pressure, and bottom-hole pressure obtained from a series of tests at various rates of production are shown by curves in Figure 11. These tests were taken from a well producing from the Hunton lime in the Carr City Pool, Seminole County, Oklahoma. They were made over a period of about two weeks, and were taken at random, rather than in the sequence of the plotted points. The pressure in the producing formation did not change any measurable amount during this period. Subsequent tests have not given the uniform relationship of casinghead pressure with bottom-hole pressures and rate of production that was obtained in this series. Similar data on a number of wells have shown that the correlation between the casinghead pressure and bottom-hole pressure is often indefinite and becomes more irregular as the bottom-hole pressure approaches the pressure in the producing formation.

Pressure Gradients

Pressure gradients have been taken in wells flowing naturally and by gas lift. Some typical gradients are shown in Fig-

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ure 10. Additional well data, at the time these pressures were taken, are given in the following table:

Curve	Size of flow string	Absolute gas-oil ratio at top of well (cu. ft. per. bbl.)	Velocity at top of flow string (ft. per sec.)
A	8⅝"	28	1.2
B	8⅝"	36	0.4
C	8⅝"	68	56.5
D	8⅝"	104	81.6
E	8⅝"	669	35.3
F	7"	1,065	141.3
G	5 3/16"	1,420	94.4

Curves A, B, C, D and E are on the same well under different pressure conditions. The curves are plotted on semi-logarithmic paper and most of the points approach a straight line in the lower part of the flow string, but toward the

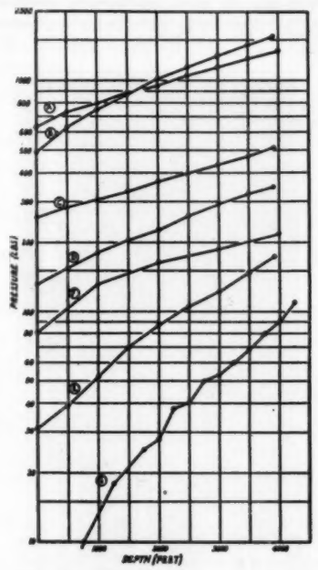

Figure 10—Pressures at various depths in flowing wells.

top of the well there is a tendency for the gradient to become steeper except in Curve C. It suggests that the place at which this change occurs may be the place where the flow changes from viscous to turbulent. The velocity at this point probably varies with the absolute gas-oil ratio, because it shows up on the low as well as the high velocities. These curves indicate that the flow of oil and gas mixtures through vertical pipes is probably more regular and the loss in pressure less than is generally considered.

Under Operating Conditions

Bottom-hole pressures have been taken in pumping wells under operating conditions by placing the gauge in a per-

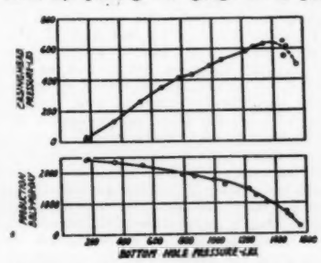

Figure 11—Correlation of bottom hole pressure, rate of production and casinghead pressure.

forated anchor below the standing valve. The chart obtained in one of these wells is reproduced in Figure 6. This well had been shut down for over 24 hours at the time this chart started and the pressure recorded was 53 pounds which is considered as the formation pressure. After pumping five hours the pressure decreased to 30 pounds, which is 66 per cent of the formation pressure (absolute). The pressure did not change during the test of the period of the chart (33 hours). During this time production averaged 16 bbls. per hour. Another well had a formation pressure of 69 pounds, and

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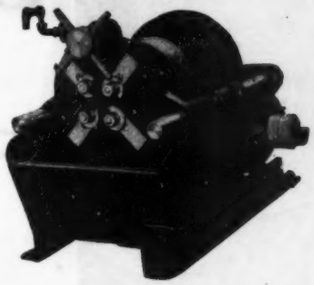

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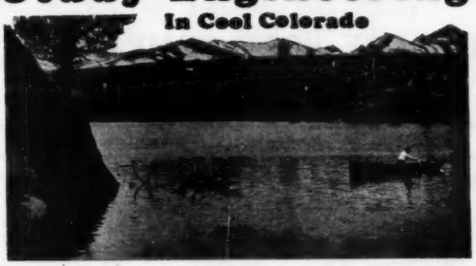

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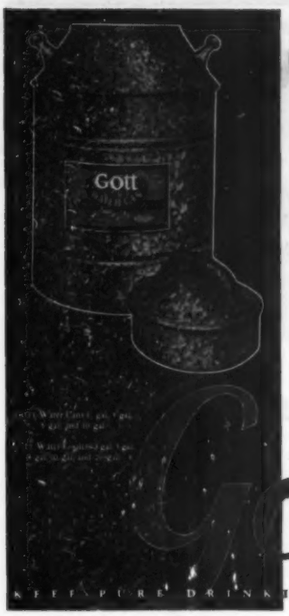

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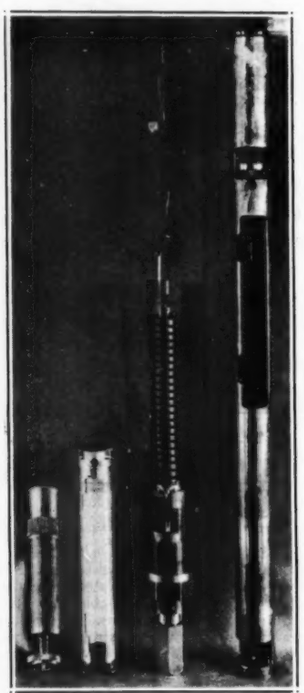
pumped 27½ bbls. per hour, with a bottom-hole pressure of 56 pounds which is 84 per cent of the formation pressure (absolute). It is probable that the amount of oil pumped from each of these wells was limited by the capacity of the pump as it is unlikely that the maximum amount of oil was delivered to either well with so low a differential pressure in the formation. A knowledge of bottom-hole pressures in pumping wells will give as much data for solving recovery problems as in flowing wells. It will also give information as to whether the rate of production obtained is limited by the capacity of the pump or by the capacity of the sand to deliver oil to the well.

Summary

Production control and lifting procedure can be more intelligently directed when bottom-hole pressures and pressures within the producing formation are known. By comparing these pressures the operator may determine whether the rate of production being obtained is limited by the capacity of the method of lifting the oil or by the capacity of the well to produce. The best size of flow string for a well flowing naturally or by gas lift must be determined by the use of an estimated, calculated, or measured bottom-hole pressure, and the degree of accuracy is in proportion to the accuracy of the bottom-hole pressure upon which the calculation is based. Production control used to obtain more efficient use of the gas energy accompanying the oil, to retard bottom water invasion, or to obtain more effective natural water flood, is usually accomplished by regulating the pressure at the casinghead or changing the operating method. These are indirect methods because a change in the rate of production is a result of change in the bottom-hole pressure (more specifically a change in the differential pressure between the producing formation and the bottom of the hole) caused by a change of the casinghead pressure or method of operation. Reliable pressures at the bottom of oil wells and in the producing formation are essential in solving problems of lifting and recovery of oil.



Amerada bottom hole pressure gauge showing from left to right: Clock, chart carrier, pressure element and case with drive screw in place.

RUMANIAN COMPANY EARNINGS

Astra Romana, one of the largest Rumanian oil companies, has declared a dividend of 6 per cent. The statement showed a 1930 net profit of $2,700,000, equal to 24 per cent on the capital. Sir Henri Deterding and Camille Blondel were re-elected to the board of directors.

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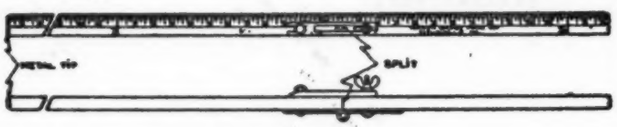
Sale of oil and gas leases. Department of the Interior, United States Land Office, Las Cruces, New Mexico. Notice is hereby given that the following described land in Eddy County, New Mexico, is offered for lease under Section 17 of the act of February 25, 1920 (41 Stat. 437), at the customary royalty schedule in the standard lease form, and subject to the following conditions: 1. Unit No. 1: T. 18 S., R. 27 E., N.M.P.M.—Sec. 8, NE¼, NE¼, NW¼—200 acres. 2. The lessee shall agree to unite with others in adopting and operating under a cooperative or unit plan of development or operation of said field whenever determined and certified by the Secretary of the Interior to be necessary or advisable in the public interest, and 3. The lessor consents that, if the oil and gas resources of said land can be recovered adequately by means of wells drilled, or to be drilled on adjacent lands, in lieu of drilling and producing wells on the leasehold, the lessee may pay a sum estimated to reimburse the United States for current loss of royalty, such sum, unless determined under a cooperative or unit plan of operation approved by the Secretary of the Interior, to be fixed monthly by the supervisor of oil and gas operations, subject to approval by the Secretary of the Interior whose decision shall be final. Said lease will be offered for sale at public auction in the United States Land Office, Las Cruces, New Mexico, at 10 O'clock A.M. on May 23, 1931, to the highest qualified bidder on the terms specified. The successful bidder must deposit on the date of sale with the officer in charge of the sale, a certified check on a solvent bank, or cash, for one-fifth of the amount bid by him and file the showing of qualifications to receive a lease required by Section 15 of the said regulations. Bidders are warned against violations of the provisions of Section 59, U. S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids in the discretion of the Secretary of the Interior. (Signed) V. B. May, Register.

LEGAL

Department of the Interior, Washington. Call for bids to Purchase Royalty Oil and Royalty wet gas accruing to the United States from the North Dome, Kettleman Hills, California, oil and gas field. Pursuant to the provisions of Section 36 of the act approved February 25, 1920 (41 Stat., 437), sealed proposals, in duplicate, will be received in the office of the Secretary of the Interior, Washington, D. C., on or before noon on June 1, 1931, from responsible bidders for the purchase, for a period beginning July 1, 1931, of all royalty oil and of all royalty wet gas accruing to the United States from Government lands in the North Dome, Kettleman Hills, California, oil and gas field. Information as to the approximate quality and quantity of the oil and wet gas offered for sale may be obtained from the Director, Geological Survey, Department of the Interior, Washington, D. C., or the Supervisor, Geological Survey, Taft, California. Bids are invited on six separate items as follows: Item 1.—Royalty oil for the period beginning July 1, 1931, and ending March 31, 1932. Item 2—Royalty oil for the period beginning July 1, 1931, and ending March 31, 1934. Item 3—Royalty oil for the period beginning July 1, 1931, and ending March 31, 1936. Item 4—Royalty wet gas for the period beginning July 1, 1931, and ending March 31, 1932. Item 5—Royalty wet gas for the period beginning July 1, 1931, and ending March 31, 1934. Item 6—Royalty wet gas for the period beginning July 1, 1931, and ending March 31, 1936. Bids for oil must be a differential stated in cents per barrel over the average monthly field price received for other oil produced in said field by the Kettleman North Dome Association, and bids for wet gas may be stated either as a flat rate in cents per thousand cubic feet or as such flat rate plus a differential in cents per gallon of gasoline content. Delivery of royalty oil and royalty wet gas will be made in the field by the Kettleman North Dome Association without cost to the Government to the successful bidder or for his account. Payments for the royalty oil and royalty wet gas are to be made to the Register of the United States Land Office, Sacramento, California, on or before the fifteenth day of each month following that in which delivery is made. The quantity and quality of the oil will be determined by tests, corrected for impurities, and the volume computed in terms of standard barrels at 60° F.; the quantity of gas will be determined by orifice meters using a standard pressure base of 14.73 pounds per square inch and standard temperature of 60° F., and the gasoline content of gas will be determined by standard charcoal or other tests satisfactory to the Government. Each bidder must submit with his bid a bond in the sum of $1,000 or a certified check payable to the order of the Secretary of the Interior in the sum of $1,000 as a guarantee that he will, if successful, promptly execute a satisfactory contract and furnish a bond in the sum of at least $100,000, conditioned upon full and complete compliance with the terms of the contract. The Secretary of the Interior may accept the offer of the highest bidder and/or bidders and reserves the right to reject all bids whenever within his judgment the interest of the United States demands. Sealed bids are to be submitted to the Secretary, Department of the Interior, Washington, D. C., the envelope to be marked plainly "Bid on Kettleman Hills royalty oil" and/or "Bid on Kettleman Hills royalty wet gas." No bid received after the time herein fixed for submitting bids will be considered. (Sgd.) Ray Lyman Wilbur, Secretary of the Interior. April 23, 1931.

GAUGE POLES

Any Length — For Oil Measurements



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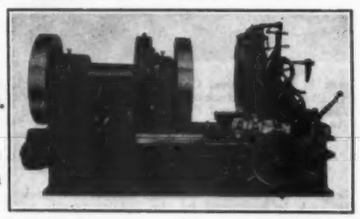

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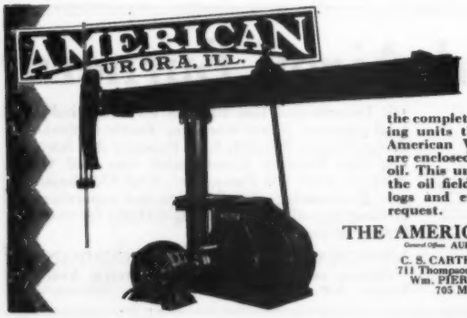

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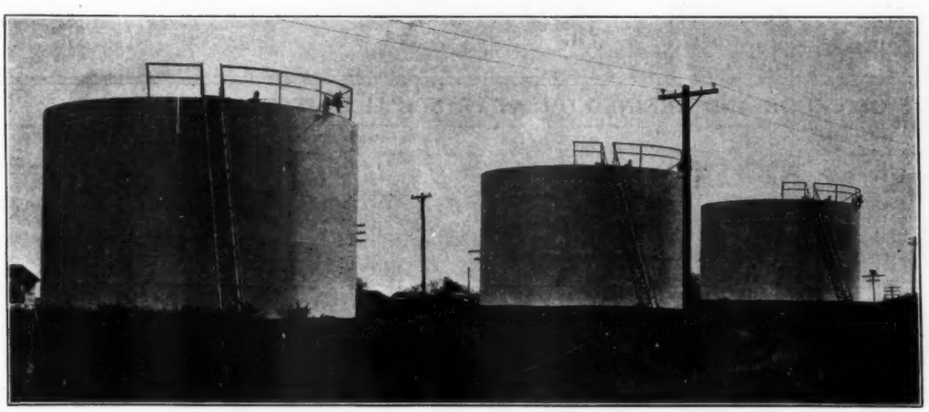

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New York San Francisco Seattle Chicago Atlanta

Oklahoma-Kansas and Eastern Pipe Line Report

OKLAHOMA-KANSAS

Pipe Line Report for Month of February

Runs

	Month (bbls.)	Dly. av. (bbls.)
Prairie P. L. Co.*	887,880	31,710
Gulf P. L. Co.	1,196,957	42,749
Texas P. L. Co.	598,142	21,184
Magnolia P. L. Co.	1,511,227	53,972
Empire P. L. Co.	1,675,555	59,842
Cosden P. L. Co.	674,187	24,078
Stanolind P. L. Co.*	2,693,418	96,193
Oklahoma P. L. Co.	2,389,924	85,354
Other lines*	5,516,000	197,000
Total February	17,133,296	612,082
Total March	18,271,263	589,394
Difference	1,132,967	22,688

Shipments

Prairie P. L. Co.†	2,147,670	76,702
Gulf P. L. Co.	1,007,357	35,976
Texas P. L. Co.	981,791	35,064
Magnolia P. L. Co.	1,308,758	46,741
Empire P. L. Co.	1,824,912	65,176
Cosden P. L. Co.	777,082	27,753
Stanolind P. L. Co.†	2,936,612	104,879
Oklahoma P. L. Co.	2,440,712	87,168
Other lines*	5,572,000	199,000
Total February	19,031,890	679,460
Total March	19,602,309	632,331
Difference	580,419	46,129

Stocks

Prairie O. & G. Co.*	37,556,000
Gulf P. L.-Gypsy Oil Co.	9,034,933
The Texas Company	3,950,066
Magnolia Petroleum Co.	6,095,273
Empire P. L. Co.	5,321,385
Mid-Continent Pet. Corp.	3,742,097
Stanolind C. O. Pur. Co.*	18,270,000
Oklahoma P. L. Co.	3,531,264
Carter Oil Co.	9,236,319
Other lines*	22,697,000
Total February	119,434,237
Total March	119,400,561
Difference	966,324

*Estimated. †Prairie and Stanolind shipments include Texas crude oil.

EASTERN PIPE LINE REPORT FOR MARCH

Runs From Wells

In the following table will be found the regular receipts from wells by various pipe lines in New York, Pennsylvania, West Virginia, Ohio, Kentucky, Illinois, Indiana and Michigan for February and March:

	Feb. '31	Mar. '31
Nat. Transit	121,907.94	137,918.13
S. W. Pa. P. L.	66,984.81	73,145.44
Eureka P. L.	271,589.18	294,873.88
Buckeye P. L.: (Macksb'g)	283,650.42	311,712.85
Buckeye P. L.: (Cleveland)	10,192.36	11,769.49
Buckeye P. L.: (Lima, etc.)	78,304.68	79,000.44
Indiana P. L.	3,593.88	3,199.09
Cumberland P. L.	158,426.03	168,106.26
N. Y. Transit	25,972.80	28,392.78
Tide Water P. L.	23,230.37	24,005.40
Pure Oil	188,721.57	212,358.30
Stoll Oil Ref.	25,934.10	32,191.99
Bradford Tran.	286,659.50	307,597.03
Total	1,544,567.64	1,684,271.08
Daily average	55,163.13	54,331.32

Petroleum Deliveries

The following tables exhibit the shipments or regular deliveries of various pipe lines in New York, Pennsylvania, West Virginia, Ohio, Kentucky and Indiana for February and March:

	Feb. '31	Mar. '31
Nat. Transit	434,836.96	565,089.04
S. W. Pa. P. L.	349,431.73	423,661.54
Eureka P. L.	329,203.94	328,329.66
Buckeye P. L.: (Macksburg)	255,836.89	265,351.57
Buckeye P. L.: (Cleveland)	1,708.34	2,440.89
Buckeye P. L.: (Lima, etc.)	1,346,381.03	1,601,658.90
Indiana P. L.	704,037.29	737,337.17
Cumberland P. L.	95,198.73	110,949.07
Southern P. L.	36,948.86	79,090.42
N. Y. Transit	158,600.37	187,287.69
Northern P. L.	159,788.80	177,499.13
Tide Water P. L.	454,444.14	362,962.53
Pure Oil	138,500.91	246,505.63
Bradford Tran.	337,789.39	341,249.76
Tuscarora	335,131.21	443,677.56
East Gulf Oil	.....	1,674.23
Total	5,137,844.59	5,874,764.79
Daily average	183,494.45	189,508.54

Gross Stocks

The gross stocks held by various pipe lines in the oil producing sections of New York, Pennsylvania, West Virginia, Ohio, Indiana and Kentucky and Indiana at the close of February and March:

	Feb. '31	Mar. '31
Nat. Transit	323,437.33	745,113.23
S. W. Pa. P. L.	432,681.19	369,482.29
Eureka P. L.	1,599,276.50	1,819,344.51
Buckeye P. L.: (Macksburg)	592,937.82	585,767.95
Buckeye P. L.: (Cleveland)	38,449.28	49,352.24
Buckeye P. L.: (Lima, etc.)	4,308,481.54	3,619,980.13
Indiana P. L.	546,697.37	611,627.34
Cumberland P. L.	645,138.76	652,425.69
Southern P. L.	322,636.70	270,576.36
N. Y. Transit	120,111.18	148,013.40
Northern P. L.	325,464.55	343,330.93
Tide Water P. L.	944,684.28	1,030,157.40
Pure Oil	649,860.39	625,831.52
Tuscarora	13,749.38	13,347.56
Brad. Trans.	141,883.72	143,185.00
East Gulf Oil	.....	4,647.01
Total	11,506,489.99	11,012,162.56
Decrease	324,602.91	494,327.43

Grades of Oil

The following table shows the amount of the different grades of oil held by eastern pipe lines at the close of February and March, showing gross stocks of the above fields:

	Feb. '31	Mar. '31
Pennsylvania	3,844,013.10	3,847,629.68
Lima	804,771.54	791,559.81
Kentucky	655,160.44	667,373.51
Mid-Continent	5,564,627.27	5,090,403.22
Michigan	637,917.64	615,196.34
Total	11,506,489.99	11,012,162.56

Daily Average Runs

The following table shows the daily average runs of the Pennsylvania, Lima and Kentucky oil fields for the past four years:

	1928	1929	1930	1931
January	52,904	51,749	75,907	53,939
February	57,002	51,833	79,256	55,163
March	57,485	54,252	76,688	54,331
April	56,812	58,444	84,536	.....
May	62,067	59,902	80,548	.....
June	58,230	58,833	75,430	.....
July	57,144	66,087	68,921	.....
August	57,745	66,087	64,291	.....
September	53,487	67,315	56,595	.....
October	58,100	76,093	58,179	.....
November	53,865	74,831	52,332	.....
December	52,025	74,561	53,999	.....

Daily Average Shipments

The following table gives daily average shipments from the Pennsylvania, Lima and other fields for the past four years:

	1928	1929	1930	1931
January	146,465	165,721	217,623	175,369
February	167,368	159,387	224,355	183,494
March	158,883	161,474	238,846	189,508
April	172,935	169,737	241,845	.....
May	180,559	184,281	248,383	.....
June	188,024	185,494	234,401	.....
July	189,470	194,763	207,094	.....
August	192,853	194,946	205,506	.....
September	194,133	201,214	193,999	.....
October	176,000	191,387	187,675	.....
November	176,893	202,743	146,638	.....
December	173,572	186,257	143,001	.....

Gross Stocks

In the following table will be found the gross stocks of the various lines of the Pennsylvania, Lima and Kentucky oil fields, including oil received from other lines at the close of each month for the past three years:

	1929	1930	1931
January	7,596,564	12,220,045	11,831,093
February	8,738,835	12,991,561	11,506,489
March	9,002,058	13,247,217	11,012,163
April	8,978,172	13,233,961	.....
May	8,903,560	13,052,953	.....
June	8,921,275	13,396,855	.....
July	9,211,595	13,268,562	.....
August	9,440,643	13,047,051	.....
September	9,443,067	12,812,018	.....
October	9,441,101	12,487,555	.....
November	9,868,538	11,851,380	.....
December	11,253,953	11,761,952	.....

The Illinois Field

The following table gives the report of the Illinois Pipe Line Co. in Illinois:

Gross stocks, April 1	2,824,608.40
Runs from wells	400,632.33
Other receipts	208,484.64
Regular deliveries	332,657.88
Other deliveries	188,220.33

The amount of Illinois oil run by the Tide Water Pipe Co. in March was 24,005.40 bbls. Deliveries were 24,005.40 bbls. Adding these figures to those of the Illinois Pipe Line Co. makes the runs and deliveries as follows:

	Runs	Deliveries
1931—		
March	424,638.33	356,663.28
1930—		
January	543,387.95	498,293.93
February	548,416.33	414,536.59
March	631,944.49	469,119.53
April	530,074.32	509,304.60
May	605,147.37	504,069.84
June	572,662.57	468,658.81
July	604,529.54	388,454.47
August	594,642.12	375,742.43
September	457,001.11	371,691.63
October	478,442.12	320,688.73
November	422,794.68	355,403.12
December	556,418.78	363,719.55
1931—		
January	468,429.04	369,573.19
February	429,284.54	461,262.85

Tide Water Pipe Co., Ltd., also delivered in March 175,613.44 bbls. Oklahoma oil.

AVERAGE DAILY RECEIPTS OF CALIFORNIA CRUDE AND REFINED OIL AT ATLANTIC AND GULF PORTS

Average barrels per day in 1930-31—	ATLANTIC PORTS Baltimore	Boston	New York	Philadelphia	Others	Total	GULF COAST PORTS Galveston	New Orleans, Baton Rouge	Port Arthur, Sabine Pass	Tampa	Total	Total all ports
April	7,767	.....	14,369	11,600	7,438	41,167	.....	.....	.....	.....	7,600	48,767
May	5,194	8,461	28,161	9,484	2,774	54,064	.....	.....	.....	.....	774	54,838
June	8,300	.....	32,933	20,767	2,333	65,333	.....	.....	.....	.....	3,400	67,733
July	17,355	7,774	43,419	23,839	6,452	98,839	.....	.....	.....	.....	4,645	103,484
August	7,418	8,742	38,968	21,226	5,258	81,613	.....	.....	.....	.....	97	81,710
September	6,300	6,400	25,600	13,400	9,567	61,267	.....	.....	.....	.....	2,433	63,700
October	2,516	3,065	27,258	16,419	4,903	54,161	.....	.....	.....	.....	5,355	59,516
November	8,367	6,233	33,800	17,733	4,600	70,733	.....	.....	.....	.....	4,800	75,533
December	5,516	4,323	30,645	9,675	3,580	53,742	.....	.....	.....	.....	4,645	58,387
January	8,387	6,613	21,968	14,678	11,096	62,742	.....	.....	.....	.....	6,129	68,871
February	5,787	2,713	29,143	4,000	5,750	47,393	.....	.....	.....	.....	3,750	51,143
March	10,032	1,611	21,388	7,324	8,774	49,129	.....	.....	.....	.....	6,355	55,484

AVERAGE DAILY IMPORTS OF CRUDE AND REFINED OIL AT PRINCIPAL UNITED STATES PORTS

Average barrels per day in 1930-31—	ATLANTIC PORTS Baltimore	Boston	New York	Philadelphia	Others	Total	GULF COAST PORTS Galveston	New Orleans, Baton Rouge	Port Arthur, Sabine Pass	Tampa	Total	Total all ports
April	31,400	8,933	123,506	40,433	19,424	223,700	.....	7,400	2,433	4,167	14,000	237,700
May	24,129	9,322	174,194	39,291	26,226	275,161	8,194	11,548	2,935	1,333	24,000	299,161
June	51,533	15,667	121,067	45,033	25,033	258,333	4,413	17,367	2,167	1,333	25,300	283,633
July	42,097	9,548	154,968	37,935	36,032	280,580	5,678	9,161	2,097	2,387	19,323	299,903
August	39,032	4,484	145,613	33,355	25,097	247,581	8,419	9,323	8,548	3,000	29,290	276,871
September	38,867	8,533	150,933	34,500	25,567	258,400	6,433	12,234	.....	3,800	22,467	280,867
October	19,839	11,742	146,194	35,355	26,967	240,097	6,065	7,067	2,774	2,545	18,451	258,548
November	39,633	35,900	124,633	36,467	24,667	261,300	2,467	7,366	.....	1,767	11,600	272,900
December	31,419	14,033	122,774	32,839	23,774	224,839	6,290	10,613	2,097	290	19,290	244,129
January	17,613	13,519	164,225	32,902	30,612	248,871	3,032	11,677	2,097	3,097	18,903	267,774
February	31,321	16,929	127,786	31,714	26,857	234,607	4,536	11,571	.....	536	16,643	251,250
March	27,645	13,935	141,160	26,290	21,129	238,161	4,065	2,580	.....	1,968	8,613	246,774

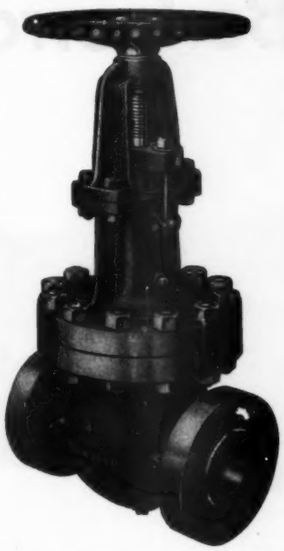
GROSS PRODUCTION OF CRUDE OIL IN THE UNITED STATES FOR 12 MONTHS

(In Barrels of 42 Gallons)

1930—		California	Oklahoma	Texas	Kansas	Arkansas	Louisiana	Rocky Mts.	Eastern	Total
March:	Month	19,699,979	19,115,406	25,503,082	2,504,395	1,817,871	1,942,938	2,237,028	4,223,000	78,143,699
	Daily average	635,483	616,626	822,679	113,045	58,641	62,675	75,388	136,161	2,520,784
April:	Month	18,768,742	19,541,310	24,799,763	3,734,253	1,724,460	1,909,552	2,334,810	4,257,000	77,069,891
	Daily average	625,625	651,377	826,659	124,475	57,482	63,652	77,827	141,900	2,568,996
May:	Month	19,044,444	20,587,503	26,219,488	3,978,385	1,659,895	1,907,482	2,566,219	4,414,000	80,376,776
	Daily average	614,337	664,113	845,786	128,335	53,545	61,543	82,749	142,387	2,592,799
June:	Month	18,020,795	19,754,700	25,643,705	3,765,060	1,704,060	1,925,621	2,519,190	4,288,000	77,621,131
	Daily average	600,693	658,490	854,790	125,502	56,802	64,187	83,973	142,933	2,587,371
July:	Month	18,802,024	18,932,514	25,973,521	3,541,409	1,713,680	2,079,769	2,576,894	3,830,000	77,348,811
	Daily average	606,517	581,694	857,856	114,239	55,280	67,089	106,674	123,548	2,491,897
August:	Month	18,770,466	17,162,624	25,069,598	3,491,530	1,700,102	2,151,120	2,193,341	2,417,000	74,955,191
	Daily average	605,499	553,614	808,696	112,630	54,842	69,391	103,011	110,226	2,417,909
September:	Month	17,984,308	16,509,120	23,111,822	3,405,510	1,583,280	2,008,060	2,239,010	3,396,000	71,237,108
	Daily average	599,477	550,304	770,394	113,517	52,776	66,935	107,967	113,200	2,374,570
October:	Month	18,244,053	16,632,522	23,626,553	3,571,913	1,636,553	2,142,585	2,225,550	3,627,000	72,707,029
	Daily average	588,513	536,533	762,147	115,223	52,792	69,135	104,050	117,000	2,345,288
November:	Month	18,109,459	14,941,770	23,035,322	3,459,390	1,557,870	2,136,948	2,957,100	3,222,000	68,419,899
	Daily average	603,648	498,059	734,507	115,311	51,929	71,231	98,570	107,400	2,280,656
December:	Month	17,786,728	15,057,103	21,810,359	3,432,661	1,590,961	2,157,534	3,118,663	3,328,000	68,281,999
	Daily average	573,765	485,713	703,560	110,731	51,321	69,598	100,602	107,355	2,202,645
1931—										
January:	Month	16,485,793	14,350,953	20,690,452	3,149,073	1,574,955	2,121,937	2,966,142	3,374,000	65,223,310
	Daily average	531,798	479,063	667,435	101,583	50,805	68,772	95,682	108,839	2,103,978
February:	Month	14,930,932	13,371,876	18,964,596	3,369,016	1,402,492	1,981,476	2,747,024	3,129,000	59,896,412
	Daily average	533,248	477,567	677,307	120,322	50,089	70,767	98,108	111,750	2,139,158
Total 12 months		216,647,727	205,556,812	283,448,161	42,402,535	19,666,168	24,475,682	34,475,971	44,505,000	871,181,056

WALWORTH SIGMA STEEL VALVES & FITTINGS

WE FOR REFINERIES



SERIES 1500
SIGMA STEEL GATE VALVE

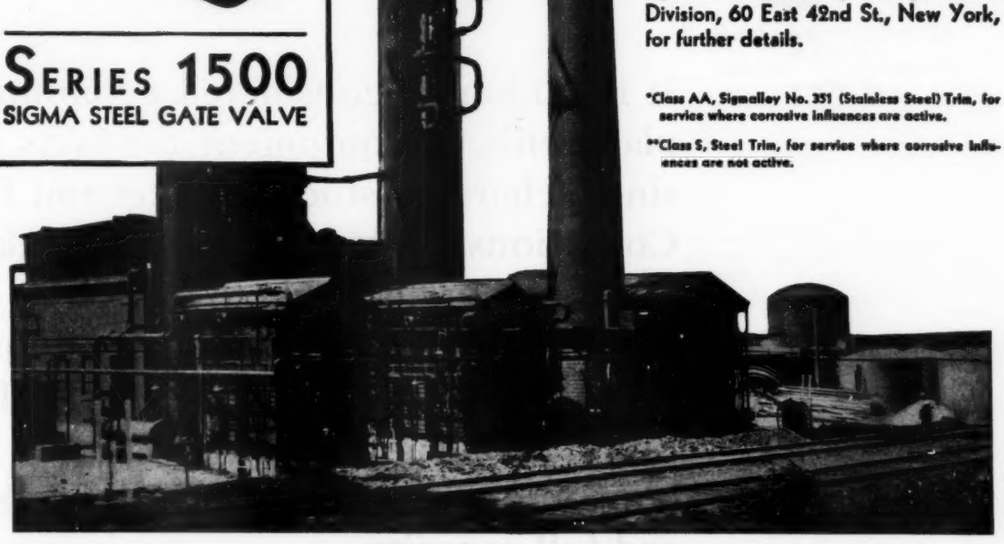
The imperative requirement of safety in refinery operation calls for the "last word" in dependable valves and fittings for high-temperature, high-pressure conditions. *Dependable* means Walworth Sigma Steel—the steel with integrity from its outside surface through its heart.

Walworth engineers, recognizing that a steel casting can be only as good as its structure is sound, applied modern science to the perfection of foundry technique in the development of Walworth Sigma Steel. The result is a sound, homogeneous steel, free of internal cracks, blow holes, sand inclusions and other casting defects.

In refinery operations we unhesitatingly recommend Walworth Sigma Steel valves, Class AA* or Class S**, for service at pressures as high as 1500 lbs. per sq. in. Write to our Engineering Products Division, 60 East 42nd St., New York, for further details.

*Class AA, Sigmalloy No. 351 (Stainless Steel) Trim, for service where corrosive influences are active.

**Class S, Steel Trim, for service where corrosive influences are not active.



WALWORTH

Walworth Company, General Sales Offices: 60 East 42nd St., New York
Walworth Company Limited, 660 St. Catherine Street West, Montreal, P. Q.
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... Distributors in Principal Cities of the World ...

VALVES FITTINGS AND TOOLS

The Oil and Gas Journal, issued weekly by The Petroleum Publishing Company, 114-116 West Second Street, Tulsa, Oklahoma. Subscription price $6.00 a year; 15 cents a copy. Entered as second-class mail matter December 15, 1911, at the post office at Tulsa, Okla., under the Act of March 3, 1879.

Tomorrow's Charging Stock May Be Corrosive

SMITHLined Coking Drum 8 ft. x 38 ft. for Standard Oil Company of Indiana

It is no longer considered economic to plan refinery equipment for runs of a single charging stock. Market and Field Conditions may at any time make it necessary or desirable to switch to corrosive crudes...The Refinery equipped with SMITHLined—SMITHWelded Equipment can handle any crude and continuously maintain full pressure and full capacity.

A. O. SMITH CORPORATION
General Offices: Milwaukee, Wisconsin
OIL AND GAS FIELD PRODUCTS DIVISION
District Offices: *New York · Tulsa · Houston · Los Angeles*

SMITHWELDED

SMITHLined Head for Coking Drum—Standard Oil Company of Indiana

CORROSION-PROOF

SMITHLined Pressure Vessels

The thinning of vessel walls due to corrosion has been a problem since oil cracking began. The all-metal, corrosion-proof lining relieves the steel of the burden of resisting corrosion.

SMITHLINED

QUALITY

BEYOND QUESTION

Trunk and gathering lines from the oil and gas fields to refineries and distant cities and industries form a vast network, covering thousands of miles and involving the expenditure of millions of dollars.

Pipe used in these lines must be of unquestionably high quality. With the working qualities and straight, uniform sections that mean ease of installation in the field it must combine the strength and soundness that insure long, trouble-free service.

The confidence felt by oil and gas companies in Bethlehem Pipe is shown by the large and increasing tonnages in which it is being used in pipe-line construction.

Bethlehem maintains at Wilmington, Calif., and at Houston, Texas, well-assorted stocks of line pipe, ready for immediate shipment. Both threaded and coupled and plain-end pipe are included in these stocks.

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District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Cincinnati, Detroit, Chicago, St. Louis
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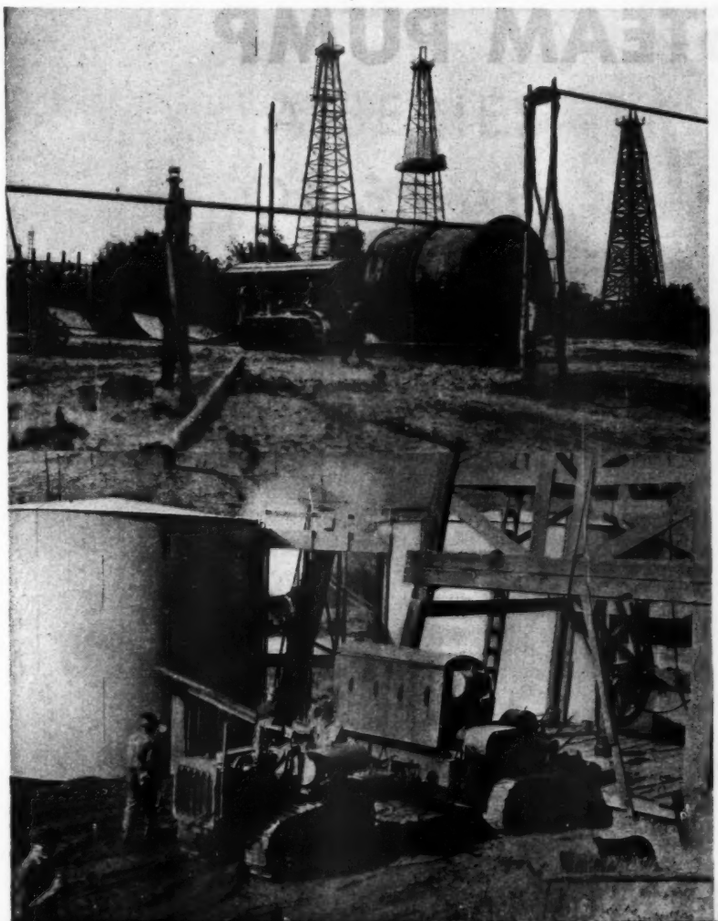
BETHLEHEM STEEL PIPE

"Caterpillars" in the WORLD'S OIL FIELDS



HAULING over poor roads or no roads at all is a distinctive feat of the "Caterpillar" track-type Tractor. Steep grades, mud, sand and winter weather all yield to the wide, ground-gripping tracks. Here are views selected almost at random—scenes from Roumania, the United States and Venezuela. And after the hauling is done "Caterpillars" keep endlessly busy at other tasks where power and traction are needed in abundance.

Prices—f. o. b. Peoria, Illinois

TEN	$1100	TWENTY	$1900
FIFTEEN	$1450	THIRTY	$2375
		SIXTY	$4175

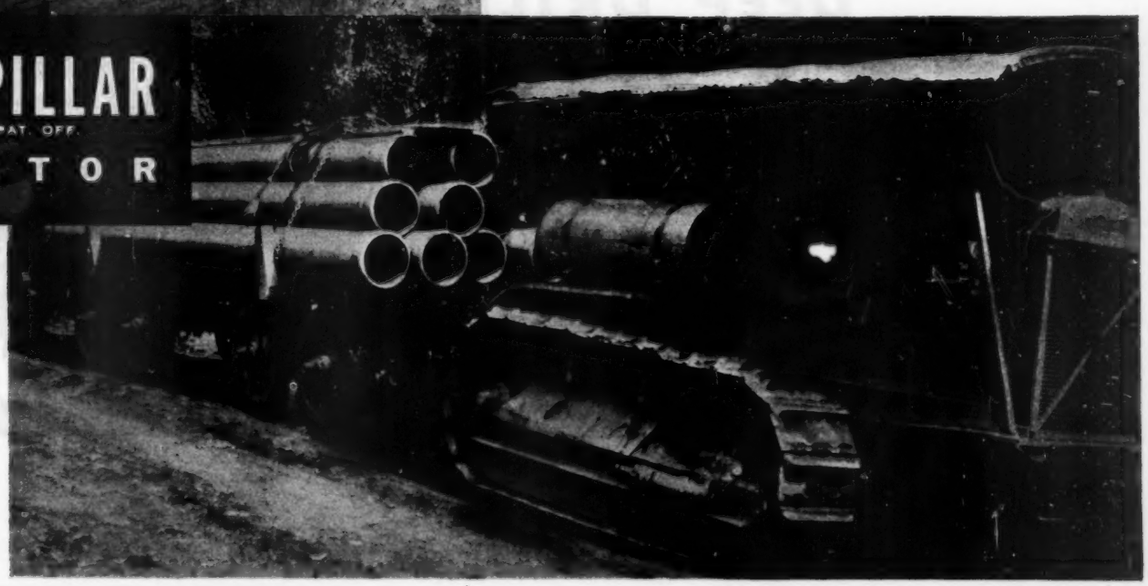
Caterpillar Tractor Co.

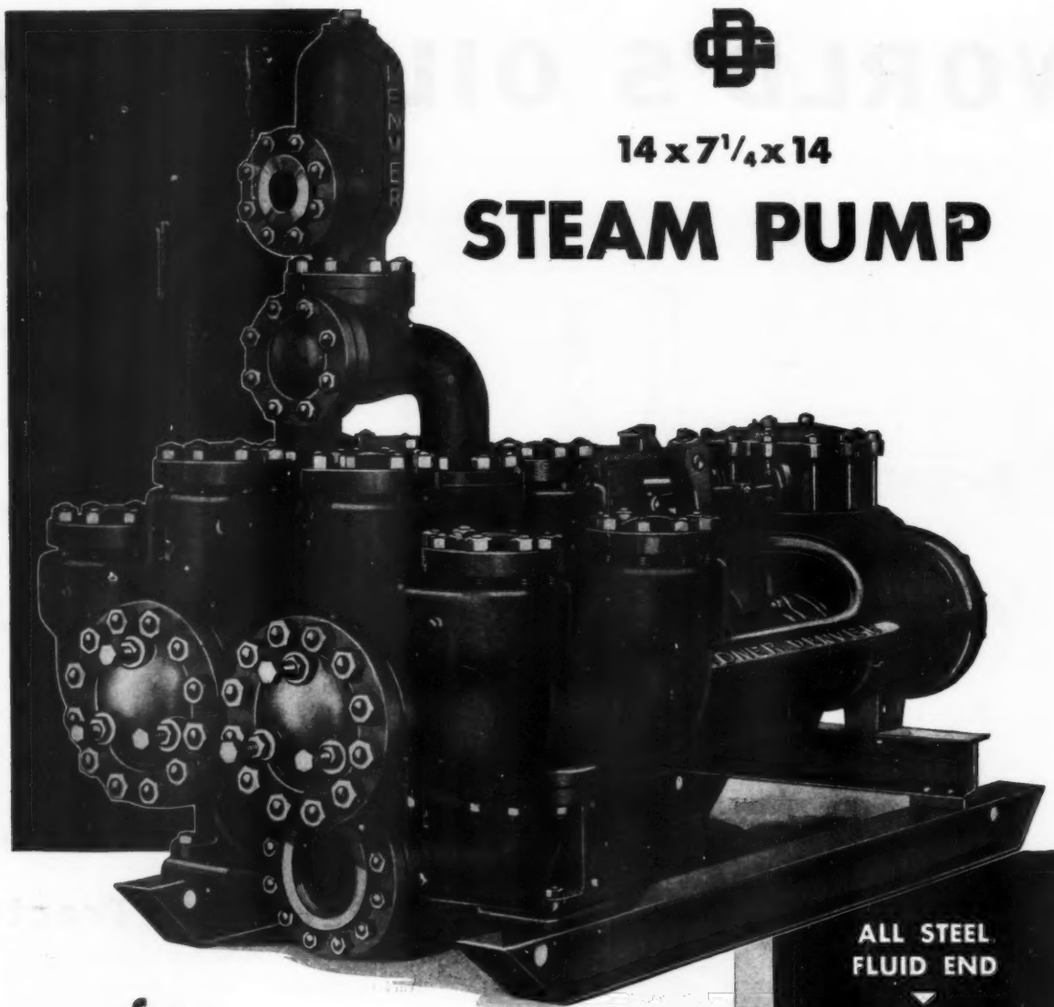
PEORIA, ILLINOIS, U. S. A.

Track-type Tractors Combines Road Machinery

(There's a "Caterpillar" Dealer Near You)

CATERPILLAR
REG. U. S. PAT. OFF.
TRACTOR





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STEAM PUMP

for

DEEP DRILLING

ALL STEEL FLUID END

GUARANTEED 3000 LBS. CONTINUOUS OPERATION

FOR HIGH PRESSURE CEMENTING AND MUDDING OFF EXCESSIVE GAS PRESSURE

GARDNER-DENVER COMPANY
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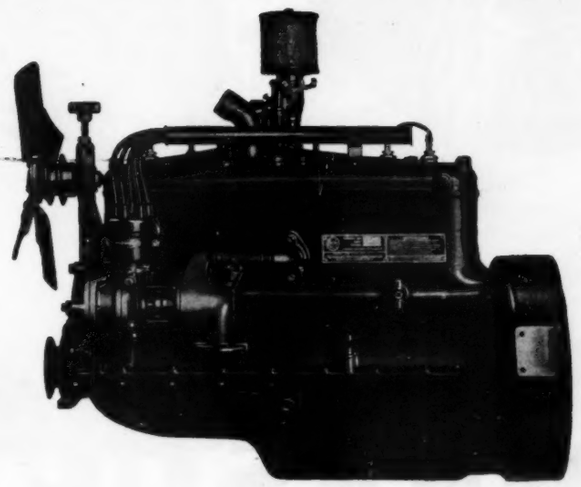
THE HERCULES "JX" MODELS

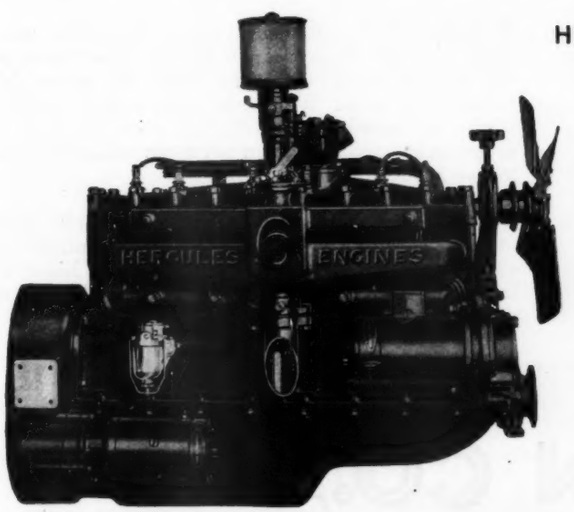
A SERIES OF SMALL HEAVY-DUTY SIXES



FOR applications requiring six-cylinder engines in the lower horsepower ranges, Hercules has developed the "JX" Series.

With exceptional torque ability, large bearing areas, extra-thorough lubrication, high-volume water circulation, seven-bearing crankshaft and other typical Hercules features, the Hercules "JX" Models have been designed particularly to meet the present day need for small, heavy-duty, high-speed engines.

The Hercules "JX" Series, comprising three models, is offered as a companion line to the popular "00" Series of Hercules Fours. They include full provision for all accessories. Complete information and details will gladly be furnished on request.



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Canton, Ohio, U. S. A.

New York Office: Chanin Building, New York, N. Y.
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West Coast Office: Russ Building, San Francisco, Cal.

SPECIFICATIONS

Model	Bore	Stroke	Displacement
JXA	3-3/8	4-1/4	228 cu. in.
JXB	3-5/8	4-1/4	263 cu. in.
JXC	3-3/4	4-1/4	282 cu. in.

HERCULES ENGINES

MEASUREMENT CONTROL~

from Hundreds to Millions —*without Human Hands*

Here at last is a perfected automatic device that definitely controls the measurement of fluid between high and low limits. Maximum and minimum differential limits may be easily set, so that the new Neilan Differential Limit Controller will operate alertly on a meter run hook-up and cut in such additional meters as may be required. As soon as the load drops again the additional meters are automatically cut out. Furthermore this Neilan Controller may be used to close a valve in a transmission pipe line in the event of a break in the line. It may also be used to supply additional fluid make-up during peak load periods.

A similar Neilan Pressure Limit Controller may be used for controlling pressure limits. It will accurately maintain discharge pressure limits on steam driven compressor units. It automatically cuts in additional pumps or turbines when the line pressure drops to a set pressure, and cuts them out again when they are no longer needed.

These two new Neilan devices have an infinite number of other oil and gas, industrial and public utility applications. Neilan Differential or Pressure Limit Controllers are exceptionally efficient and will save their moderate cost in a short time.

We'll send you the interesting descriptive Bulletin No. 4050-B on request.

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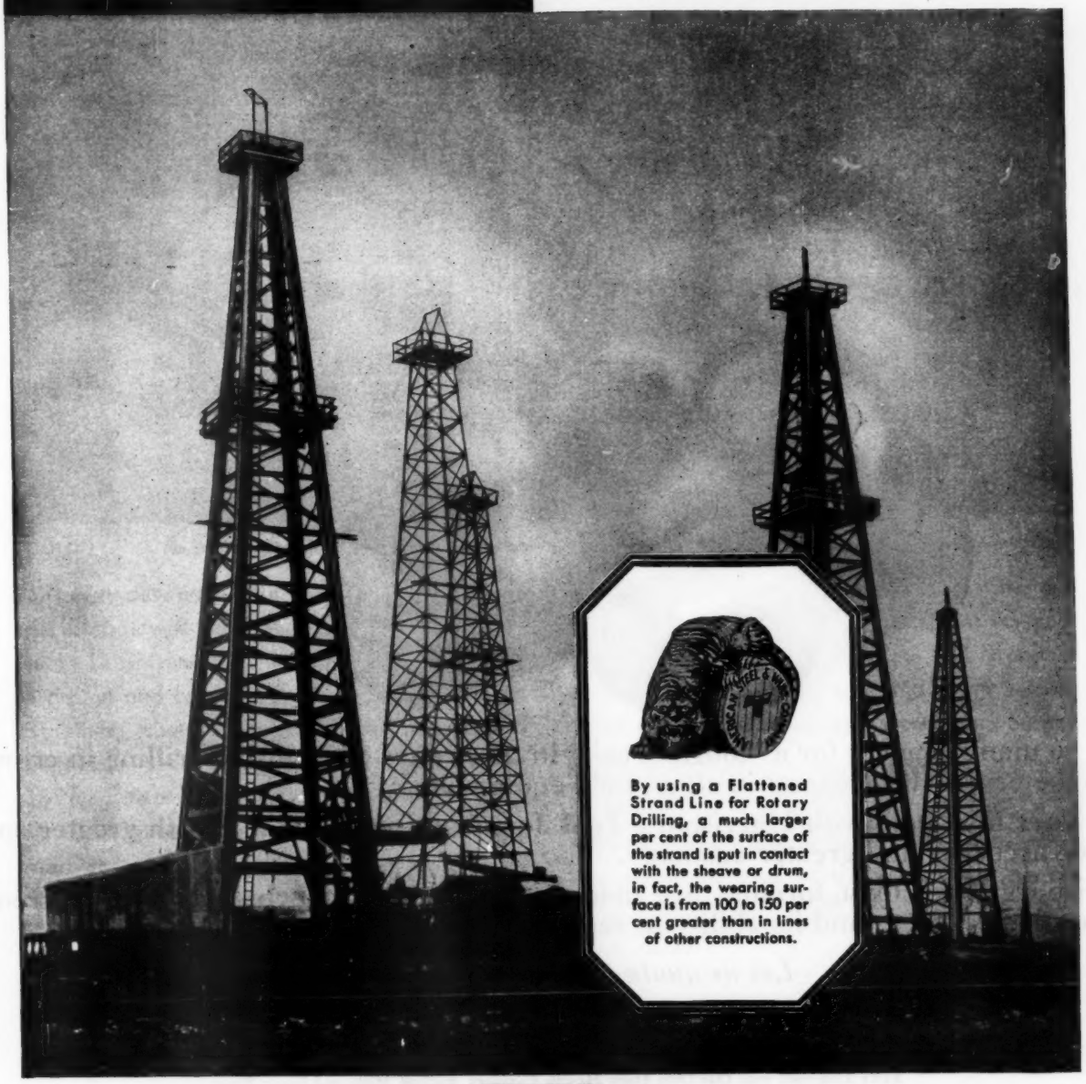
Where Dependability is Vital

In the oil fields—where uninterrupted service is vital—the selection of wire lines deserves more than ordinary care. Because of their proved dependability and greater economy, most operators specify American Steel & Wire Company Wire Lines. It will pay you to know why in detail. Our engineers, in the oil country, will gladly assist you in solving your wire line problems.



By using a Flattened Strand Line for Rotary Drilling, a much larger per cent of the surface of the strand is put in contact with the sheave or drum, in fact, the wearing surface is from 100 to 150 per cent greater than in lines of other constructions.

1831 1931

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Drill your next hole with HARRISBURG TOOL JOINTS

With so many chances for a "tough break" in these days of intensive drilling in crowded fields the best is the cheapest in all oil field equipment.

Drill your next hole with Harrisburg Tool Joints and you'll drill it with greater speed, greater accuracy and greater economy.

Harrisburg Tool Joint forgings are made of steel noted for higher tensile strength, greater elasticity . . . and its ability to resist crystallization to the limit.

Let us quote on your requirements.

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Fully Equipped with Our Own Open Hearth Furnaces, Rolling Mills and Forge Shops
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HARRISBURG
Forged Seamless Steel Tool Joints

. . . . FOR BIG LOADS, HEAVY LOADS, YOU NEED HEAVY-DUTY TRUCKS

Dodge Trucks like this one are carrying capacity loads daily for those engaged in the oil industry everywhere

For heavy-duty hauling in your industry you need trucks that will haul heavy loads. » » Dodge Heavy-Duty Trucks will do that. They are rugged in design and construction through and through. Everything about them says *heavy duty*. Everything about them says *power*, says *dependability*, says *long life at low cost*. » » Whatever your heavy-duty hauling needs may be . . . whether you must head up steep hills often or over unimproved roads daily . . . there is a Dodge Heavy-Duty Truck for your job. A Dodge Truck that's modern. That's precision-built throughout and correctly balanced part to part for longer life. A truck that's dependable. That's economical. That will work for you and earn for you as no other truck will do. » » See your Dodge Brothers dealer. See and test the Dodge Heavy-Duty Truck that fits your needs. You can buy it complete with standard or special body. You will find it an exceptional value—a loyal worker, a consistent earner.

THE COMPLETE LINE OF DODGE TRUCKS RANGES IN PAYLOAD CAPACITIES FROM 1,200 TO 11,175 POUNDS—PRICED, CHASSIS F. O. B. DETROIT, FROM $435 TO $2695, INCLUDING THE 1½-TON CHASSIS AT $595

TO HELP LOWER YOUR HAULING COSTS
OPERATING RECORD BOOK FREE

DODGE BROTHERS CORPORATION A-37
Detroit, Michigan
Send your Operating Record Book. I understand there is no obligation.
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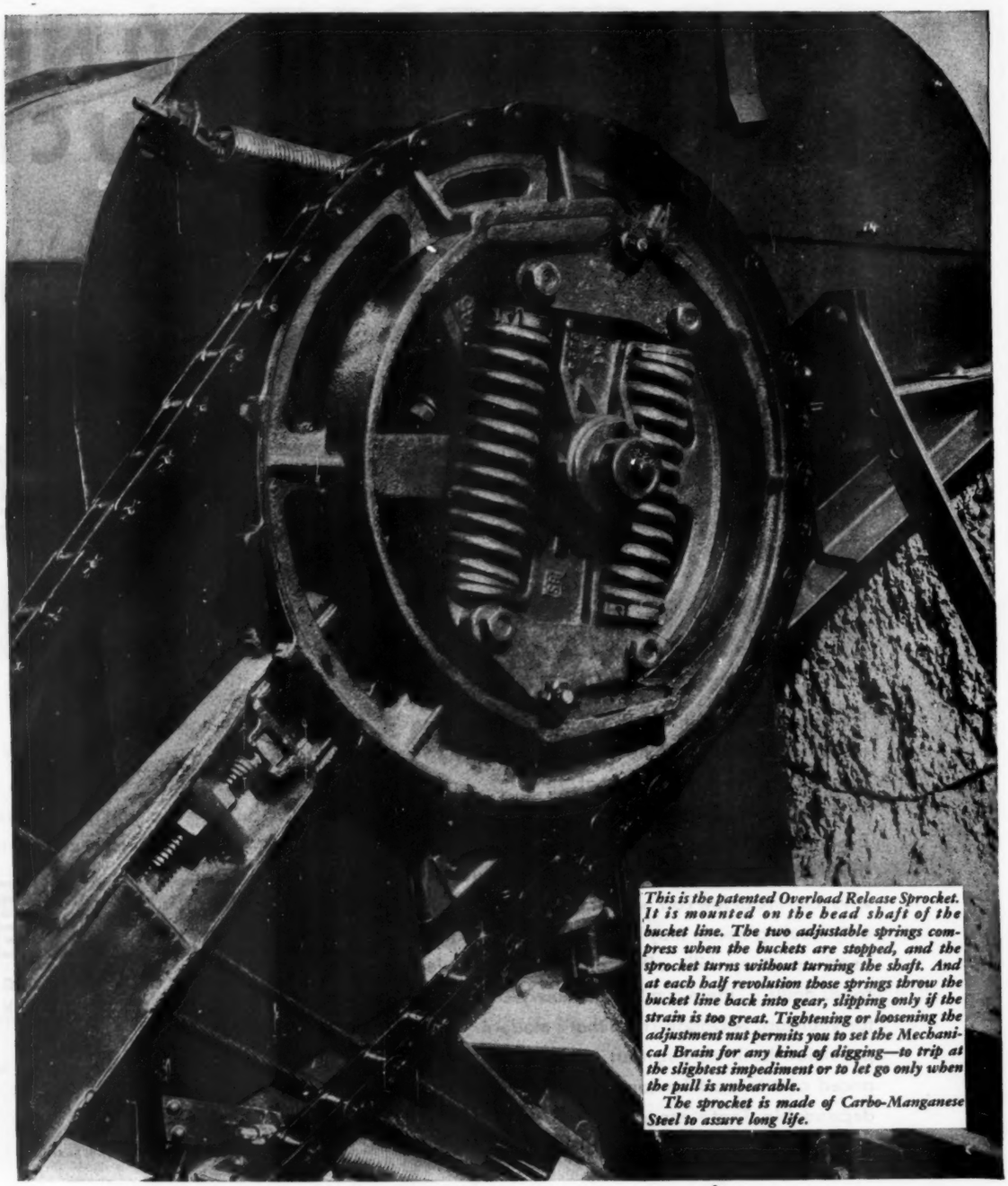
Number of Trucks Operated *(Book for each will be sent)*_____

DEPENDABLE DODGE TRUCKS

SPECIALIZING IN INVENTING FASTER, CHEAPER MACHINES



This is the patented Overload Release Sprocket. It is mounted on the head shaft of the bucket line. The two adjustable springs compress when the buckets are stopped, and the sprocket turns without turning the shaft. And at each half revolution those springs throw the bucket line back into gear, slipping only if the strain is too great. Tightening or loosening the adjustment nut permits you to set the Mechanical Brain for any kind of digging—to trip at the slightest impediment or to let go only when the pull is unbearable.

The sprocket is made of Carbo-Manganese Steel to assure long life.

BARBER GR

STANDARDIZED MATERIAL HANDLING MACHINES

600 West Park Avenue

AND METHODS

The Mechanical Brain and Milling Action Digging cut through macadam pavement—we hear of jobs like this every day.

The Mechanical Brain is invaluable on digging like this. It lets go when the strain is too great, but keeps jerking at the rocks that are in the way.

The Mechanical Brain seems to know what to dig and not to dig. The Utility Special on town job that involves a lot of house service lines. Out of 50 encountered on a Kenosha job only one was broken.

Hidden behind a spoil bank of shale shaved off by milling action digging—the Mechanical Brain eases up the shocks of such digging as this.

The High-Speed DITCHER with the MECHANICAL BRAIN

Does Surprising Things

Barber-Greene Ditchers are almost human. The B-G Mechanical Brain — Overload Release Sprocket — stops the cutting teeth when they encounter any underground obstruction—but starts them again, automatically, if the operator decides to wade through.

Pipes and conduits are seldom broken. The Mechanical Brain stops the ditching in time to save them.

And in all kinds of going, the Mechanical Brain softens the shocks of digging, saving motor and machines from sudden, straining stops.

In hard digging, the Mechanical Brain seems to sense when to ease up and when to bear down, keeping the ditcher constantly milling at whatever is in the way.

And this patented Mechanical Brain is one big reason why Barber-Greenes walk through where others dare not and cannot go. It is one reason why you practically never see a Barber-Greene broken down. It is one reason why Barber-Greenes show higher daily averages on all kinds of digging. It is one reason why Barber-Greenes invariably show lower costs per foot.

Ask for a copy of *Ditching Snapshots and Records.*

Standardized Belt Conveyors — Portable Belt Conveyors
Portable and Self-propelled Flight Conveyors
Self-propelled, Self-feeding Bucket Loaders
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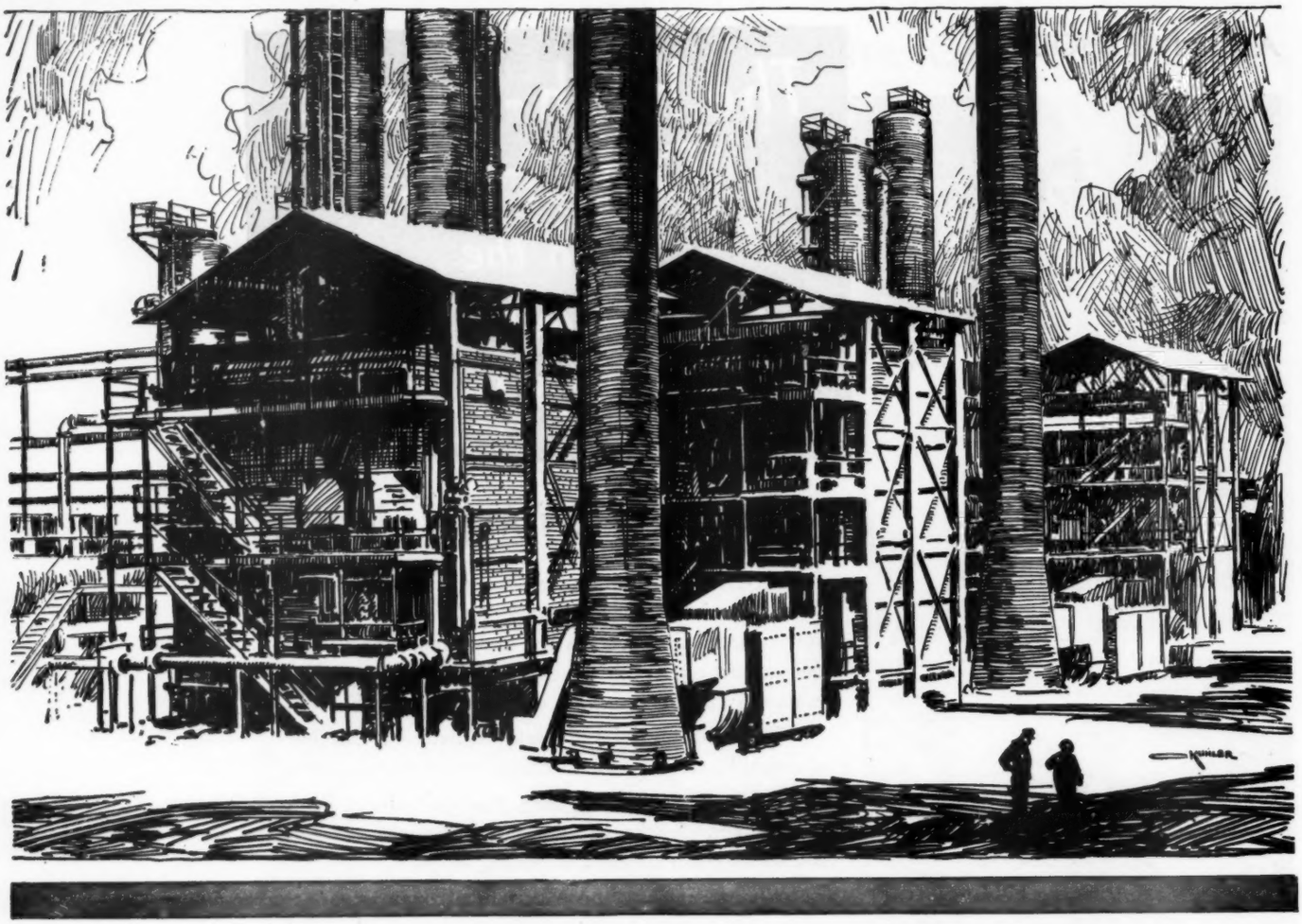
Vertical Boom Ditchers

EENE

Aurora, Illinois



THREE Kellogg furnaces serving a battery of combination viscosity breaking and Cross Cracking Units in a foreign refinery. The construction of Kellogg furnaces provides easy access to tubes and headers. Long, economical life is assured by design which gives rated capacity without overloading.

The M. W. KELLOGG CO.

225 Broadway, New York

LOS ANGELES, 1031 SO. BROADWAY

TULSA, PHILTOWER BUILDING

PARSONS
Model 35 Pipe Line Trencher

Built Up to Its Tough Job

DESIGNED by N. E. C. engineers and built by the N. E. C. organization that knows only one standard—HEAVY DUTY.

Model 35 is a dreadnaught of rugged "go through" construction and power for long distance pipe lining — capable of meeting every digging condition it might encounter! Parsons wide range of digging speeds meets conditions as they come; fast accelerated speed when there's easy soil and slow, sure, steady, capable power and performance when digging gets tough and hard!

Know the Heavy Duty Parsons Pipe Liner!

Write for catalog — know the details of this outstanding cross country performer. It's the new factor of greater pipe line trenching profits. Write for catalog today.

National Equipment Corporation

Milwaukee

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New!

UNIT PUMPING POWERS

The "OILWELL" ODH SERIES

CAPACITIES up to 20 horsepower. 1 to 30 strokes per minute. Electric-motor or engine drive coupled or belted to Westinghouse-Nuttall oil-field reduction gear. No housing needed. Low initial investment. Rigid, all-steel walking beam, pitman, sampson post and base. Use a suitable Power for your individual well condition.

OIL WELL SUPPLY CO.

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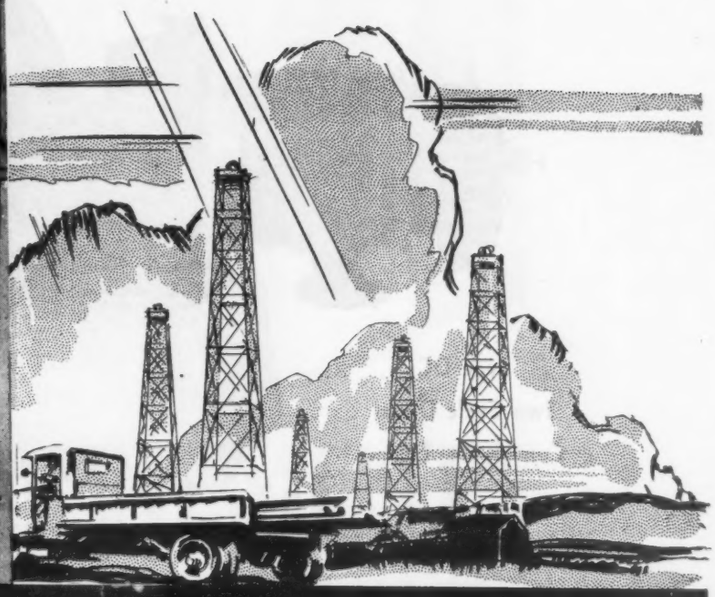
"OILWELL"

DERRICKS

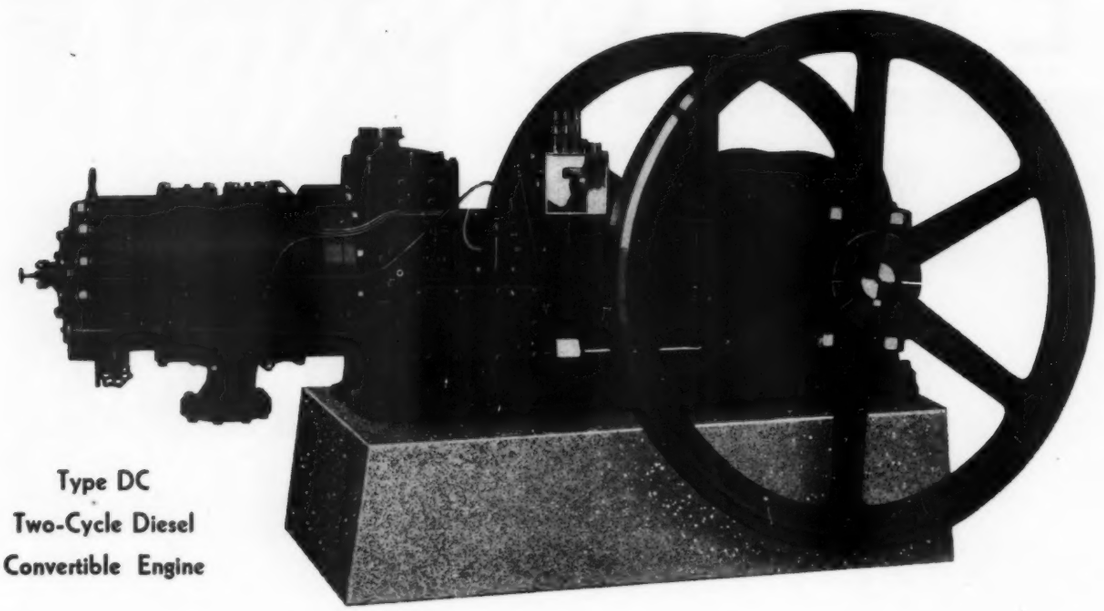


THE Challenger

Built of structural steel throughout, the Challenger is a strong well-balanced derrick. The long experience and the same conscientious effort which created the Champion have gone into the design and fabrication of the Challenger. In fact, Type D.O. Challenger, except for leg shape, has the same general construction as the Champion. To assure dependable strength in the angle leg sections, silicon steel, A.S.T.M. Designation A-94, is used. Type D.O. conforms to A.P.I. standards throughout. A lighter type, for less severe service, is also built.

Moore Challenger ANGLE DERRICK

ONE BARREL OF OIL
Runs This Engine 24 Hours



Type DC
Two-Cycle Diesel
Convertible Engine

Up in the Bolvar field in New York state, owners of Reid Type DC Diesel Convertible engines report a fuel consumption rate of less than .35 pounds per brake horsepower hour based on work output—not quite a barrel of oil per 24-hour day!

Running on Navy Specification Diesel oil in the shop tests, making 44-horsepower at 275 r.p.m. these same Type DC engines established the official rate of about .4 pounds maximum economy.

Unusually low figures? Yes, but not surprising. They could hardly be otherwise, for Reid fuel economy is incorporated into the DC design.

Reid Bulletin Number 55 contains specifications and power curves on this Reid Diesel engine convertible to gas. Write for your copy.

Reid

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Marietta and Newark, Ohio; Charleston, W. Va.; S. R. Shoup, 724 Board of Trade Bldg., Los Angeles, California.

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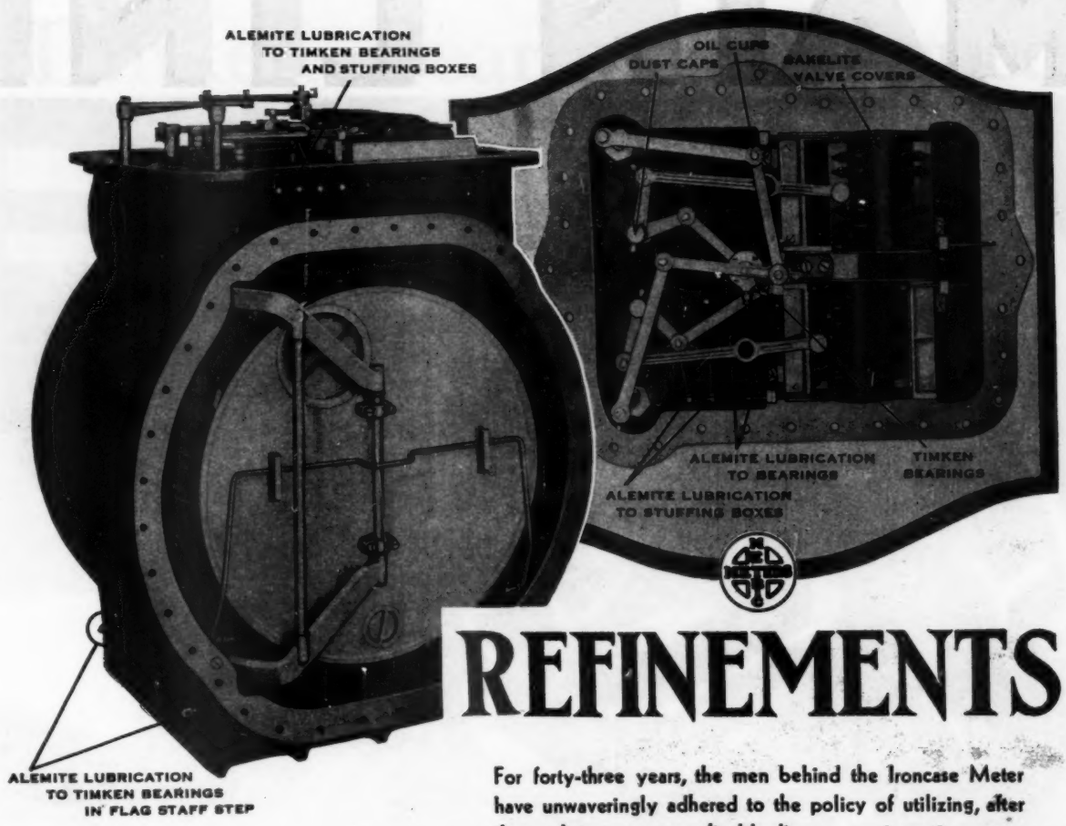
EXPORT REPRESENTATIVE
Oilfield Equipment Co., Inc., 30 Church St., New York City.

Joseph Reid Gas Engine Company, Oil City, Pa.



REFINEMENTS

For forty-three years, the men behind the Ironcase Meter have unwaveringly adhered to the policy of utilizing, after thorough test, every applicable discovery or invention, every worth-while new material or new process.

The tangible result of this policy is evident in the sum total of the refinements that distinguish design and construction in Ironcase Meters. For example:

(1) Decreases in weight despite increased capacities.
(2) Light-weight, long-wear, noiseless valves.
(3) Diaphragm leathers of exclusive origin, selection and tannage —again carefully inspected for use in Ironcase Meters.
(4) Timken bearings and Alemite lubrication in the larger sizes.

Other refinements are pleasantly reflected on gas company cost sheets in low meter upkeep and high customer satisfaction.

AMERICAN METER CO
MEASUREMENT ENGINEERS
CUBIC FEET

Write for Catalog EG-40 if you would appreciate the details of Ironcase construction.

METRIC METAL WORKS
ERIE, PENNSYLVANIA
IRONCASE, TINNED STEEL CASE and ORIFICE METERS

AMERICAN METER COMPANY
INCORPORATED
The World's Largest Manufacturers of Gas Meters and Allied Apparatus
ESTABLISHED 1836

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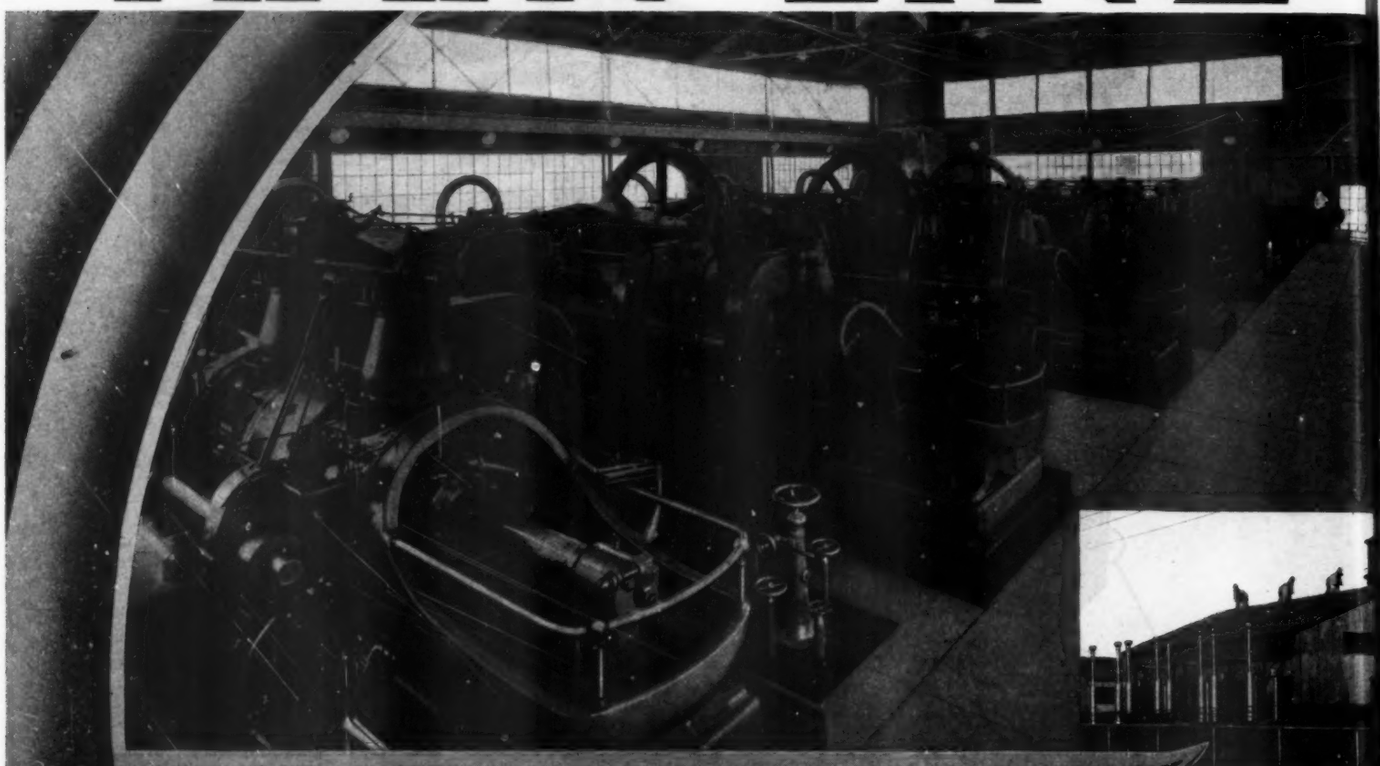
MAIN LINE



MAIN BUILDING

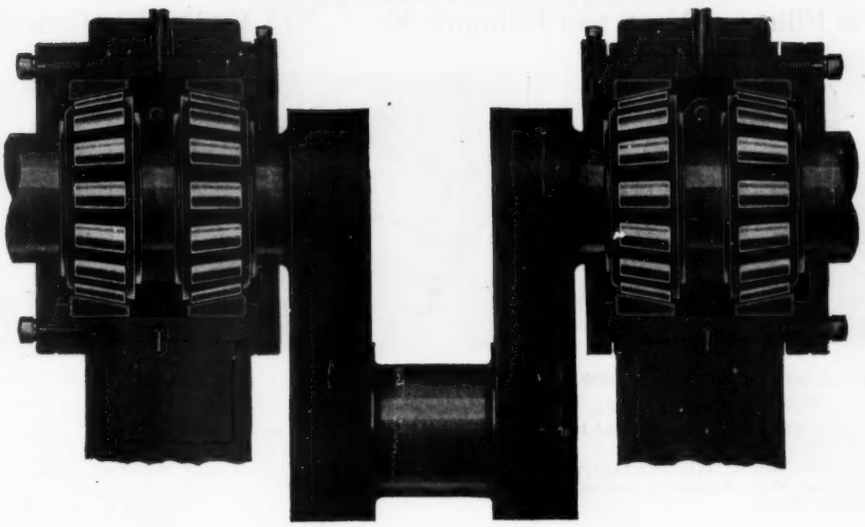
Four Cooper-Bessemer Type-22 double-acting twin-tandem 1000 B. H. P. compressor units. The Kismet compressor station of the Panhandle Eastern Pipe Line Company at Liberal, Kansas. (Station at Louisburg, Kansas, has five Type-22's).

COOPER-BESSEMER Type-22's in the main building . . . Verticals in the auxiliary building . . . an unbeatable combination!

Men who are engineering the new long distance natural gas lines see to it that the main compressor station units and their auxiliaries are chosen with equal care. Uninterrupted service to customers is one reason; utmost economy in operation and maintenance is another.

COOPER-

Timken Bearing Equipped Crank Shafts



for Better Engine Performance and Longer Life

Engines with crank shafts mounted in Timken Bearings deliver more power at the point of application and last longer than those having plain crank shaft bearings.

The reason is that Timken Bearings eliminate frictional power loss, permanently support the crank shaft in dead true alignment and protect it against wear, radial, thrust and combined loads and uneven cylinder pressures.

The resulting smooth, vibrationless operation relieves every part of the mechanism of undue strain, and thereby greatly increases the dependability and lengthens the life of the engine.

Many prominent engine builders are now incorporating Timken Bearing Equipped crank shafts in their engines for power plus performance and maximum endurance.

Don't you want this modern refinement in *your* engines? The Timken Roller Bearing Company, Canton, Ohio.

TIMKEN *Tapered Roller* **BEARINGS**

Tubing Leak Indicator Doubles Efficiency of Crew

Follow the operations of the crew in the Whittier field, as shown in pictures Nos. 1, 2 and 3. The day's job, as scheduled for the crew, is Fillmore No. 8 and Fillmore No. 11 — both off production. This pictorially shows the additional work performed by the crew, while the Indicator AUTOMATICALLY finds the leak.

8 A.M.—FILLMORE NO. 8, STARTING INDICATOR

Above picture shows Indicator being started to find pressure leak.

9 A.M.—Indicator is now AUTOMATICALLY going after the leak, thus releasing the crew for work on Fillmore No. 11.

9:15 A.M.—CREW NOW AT FILLMORE NO. 11

This well is off production. The crew runs its last stand of rods and gets well back on production by 4 P.M.

CREW BACK AT FILLMORE NO. 8

Picture shows same crew, next morning, removing Indicator at surface of Fillmore No. 8. This is a pressure leak. Under ordinary methods it would have taken several days to find leak. Moreover, the other well, Fillmore No. 11, would have been off production, the crew being forced to devote entire time to No. 8.

Quick Facts About Granger Tubing Leak Indicator

1. Works by Itself.
2. Stops Exactly at Leak.
3. Eliminates Guess Work.
4. No Chopped Rope Nor Color Methods.

This Coupon Will Bring Literature Describing the Tool in Detail

GRANGER INDICATOR COMPANY,
137 N. Greenleaf St., Whittier, Calif.

Gentlemen: Without obligation on my part please send me full information concerning the Granger Tubing Leak Indicator. No salesman will call unless requested.

Name .....

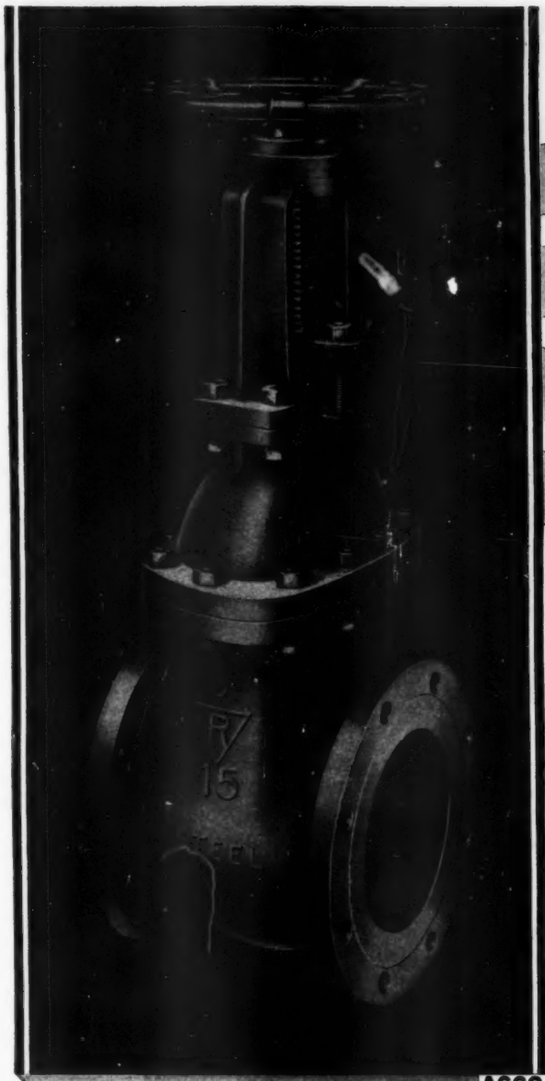
Position .....

Company .....

Address .....

GRANGER

Head Office
137 N. Greenleaf, WHITTIER, CALIF.



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Thousands of installations prove the absolute reliability of Reading Steel Valves. The electric cast steel is a product of the Reading foundry—widely known for its modern steel casting facilities. The design is so proportioned that the tremendous strains of expansion and contraction are perfectly distributed.

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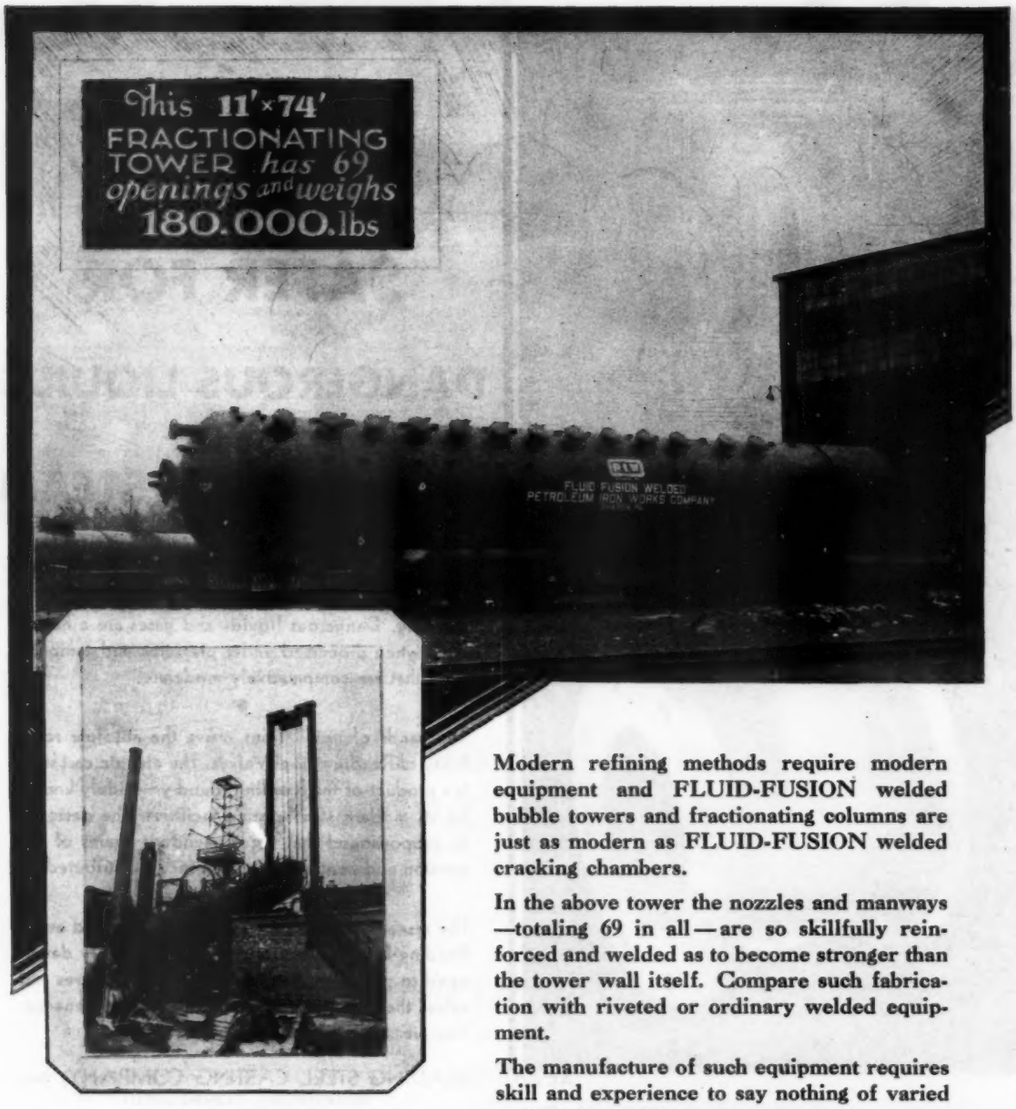

Modern refining methods require modern equipment and FLUID-FUSION welded bubble towers and fractionating columns are just as modern as FLUID-FUSION welded cracking chambers.

In the above tower the nozzles and manways —totaling 69 in all—are so skillfully reinforced and welded as to become stronger than the tower wall itself. Compare such fabrication with riveted or ordinary welded equipment.

The manufacture of such equipment requires skill and experience to say nothing of varied and costly machinery, but above all a proved and closely controlled welding method is absolutely essential—and that is exactly what P.I.W. FLUID-FUSION welding is.

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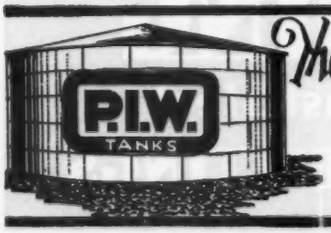
Condensers
Absorbers
Tanks up to 120,000 bbls.



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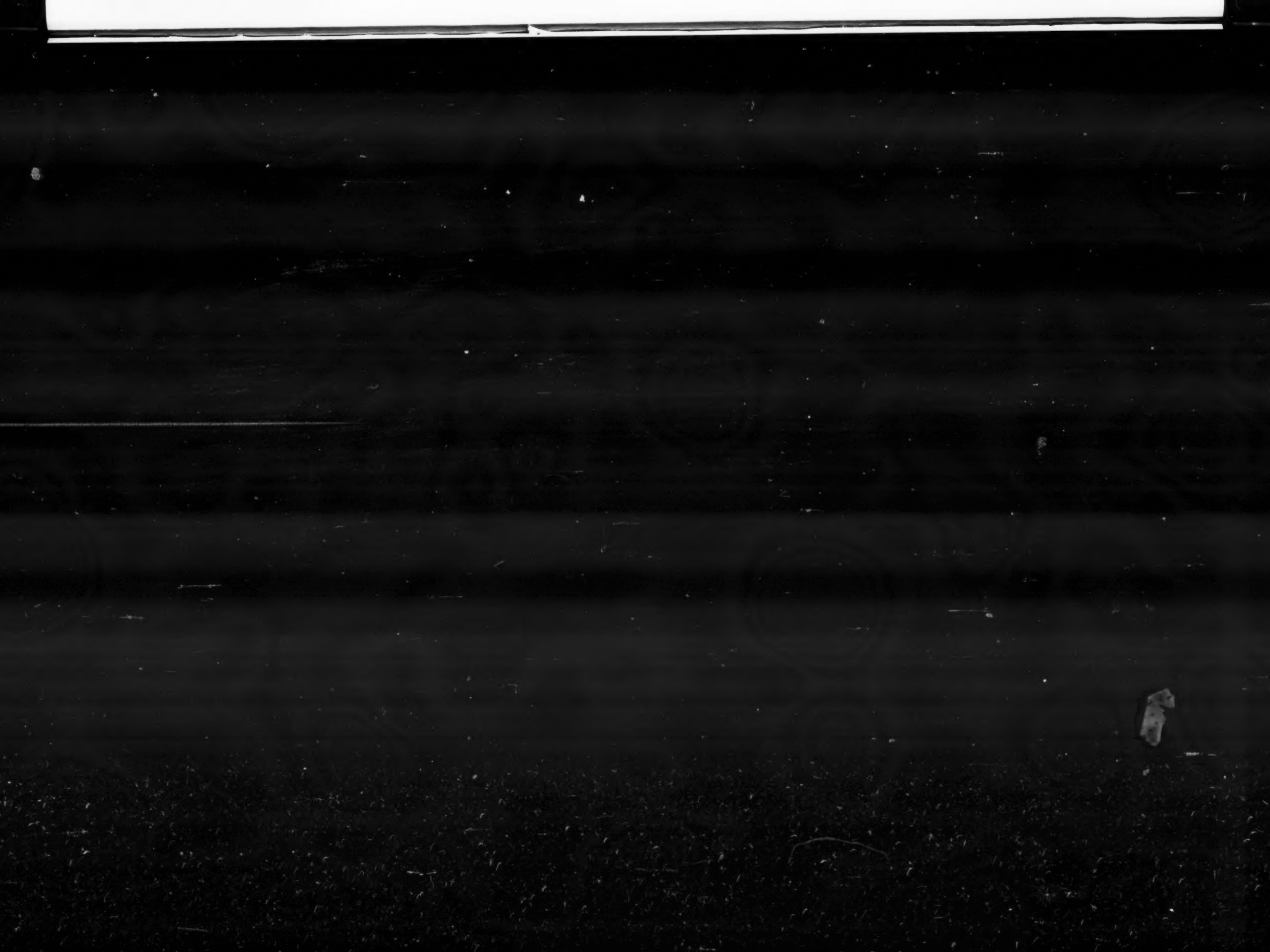

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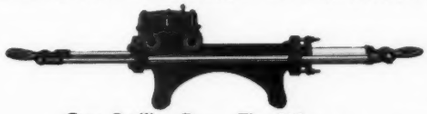
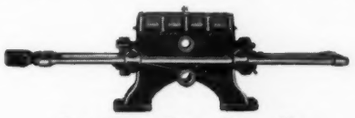
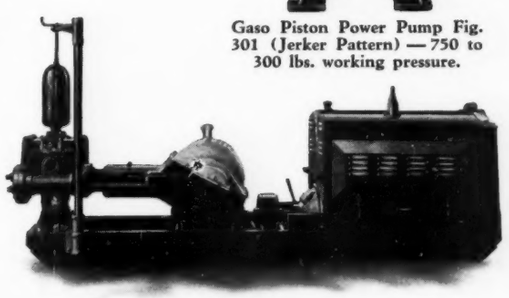


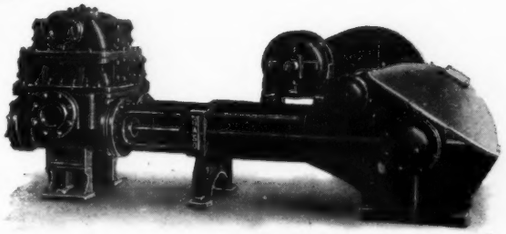
Gaso Rodline Pump Fig. 201 — a simple, easily operated pump for general service.



Gaso Piston Power Pump Fig. 301 (Jerker Pattern) — 750 to 300 lbs. working pressure.



Gaso Portable Pumping Plant Fig. 2010-W for emergency, temporary and semi-permanent service. Capacities from 63 to 250 bbls. per hour at 800 to 250 lbs. working pressure.

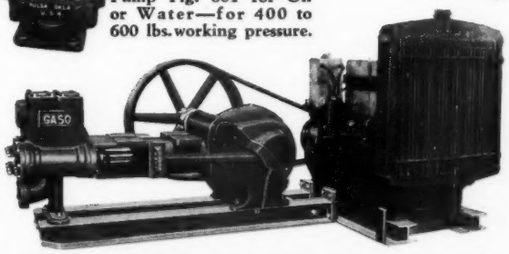


Gaso Portable Pumping Plant Fig. 2010-S — Same pump and power plant as Fig. 2010-W, except mounted on steel skids.

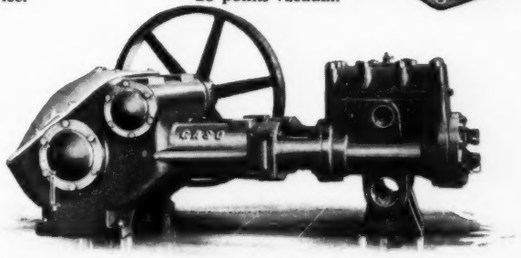
Gaso Walking Beam Pump Fig. 601 for Oil or Water—for 400 to 600 lbs. working pressure.

Gaso Fig. 1931 Timken Bearing Suction Pump. Interchangeable liners from 6 to 10" and 18" stroke. Also suitable for low pressure discharge service.

Gaso Walking Beam Pump Fig. 604 for Gas or Vacuum—gives 26 to 28 points vacuum.



Gaso Fig. 710 Timken Bearing Power Pump, shown with V-Rope drive from Buda M. A. N. High Speed Diesel Engine. Capacities from 54 bbls. per hour at 1400 lbs. pressure to 500 bbls. at 300 lbs.



Gaso All Timken Bearing Power Pump Fig. 1508. Capacities from 63 bbls. per hour at 800 lbs. pressure to 250 bbls. at 250 lbs. Arranged for any type of drive.

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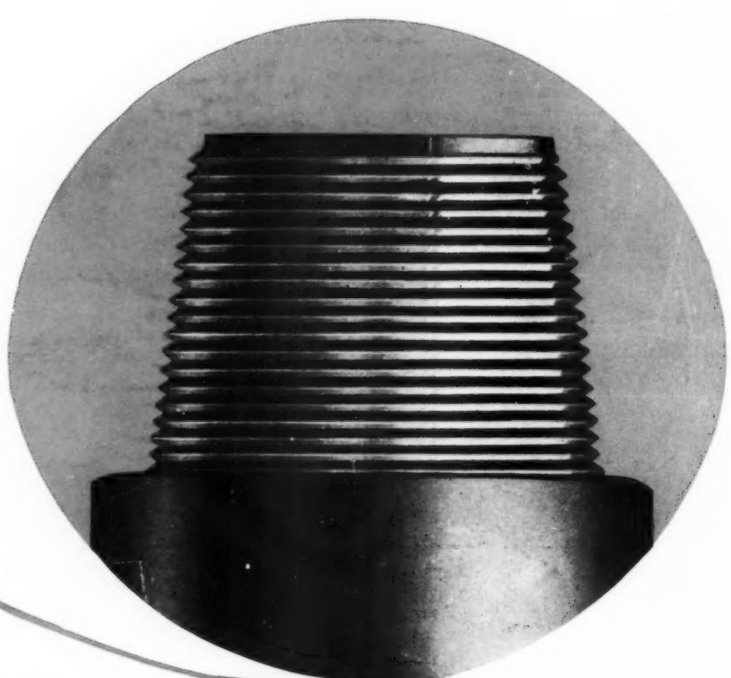

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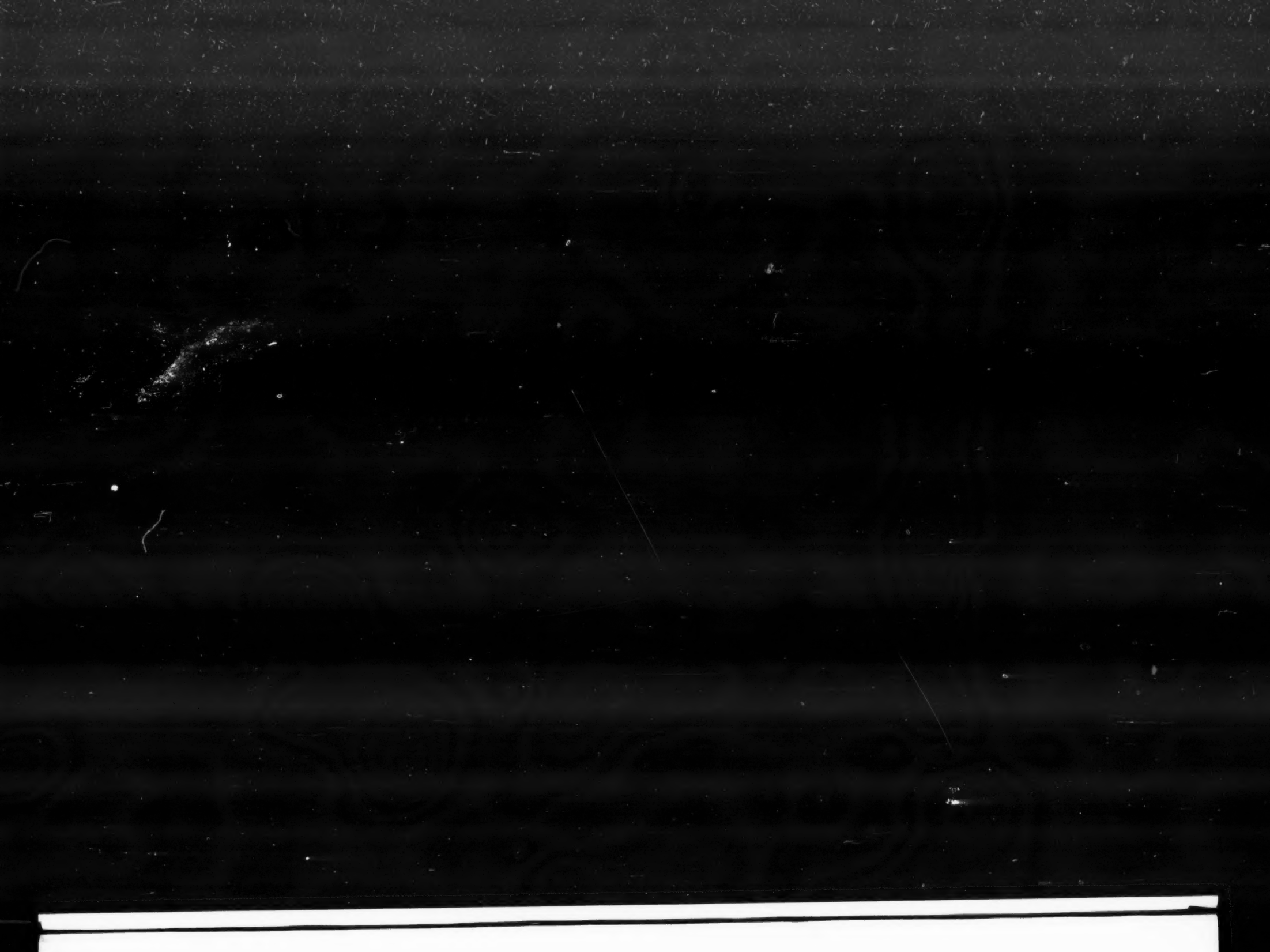
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